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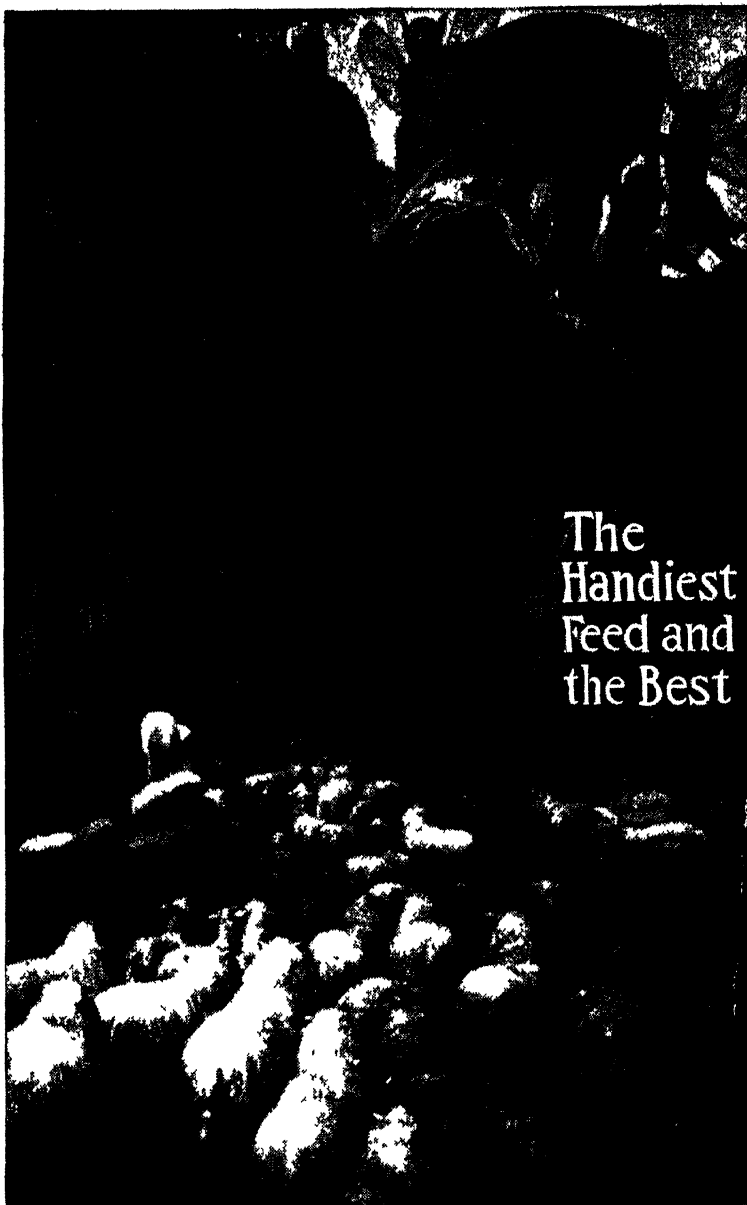
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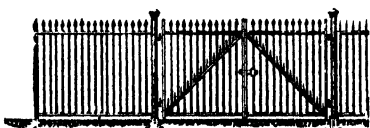
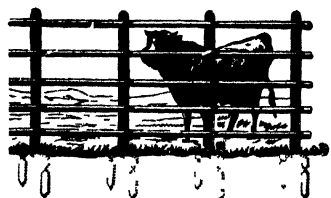
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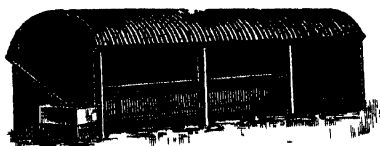
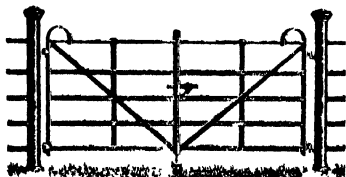
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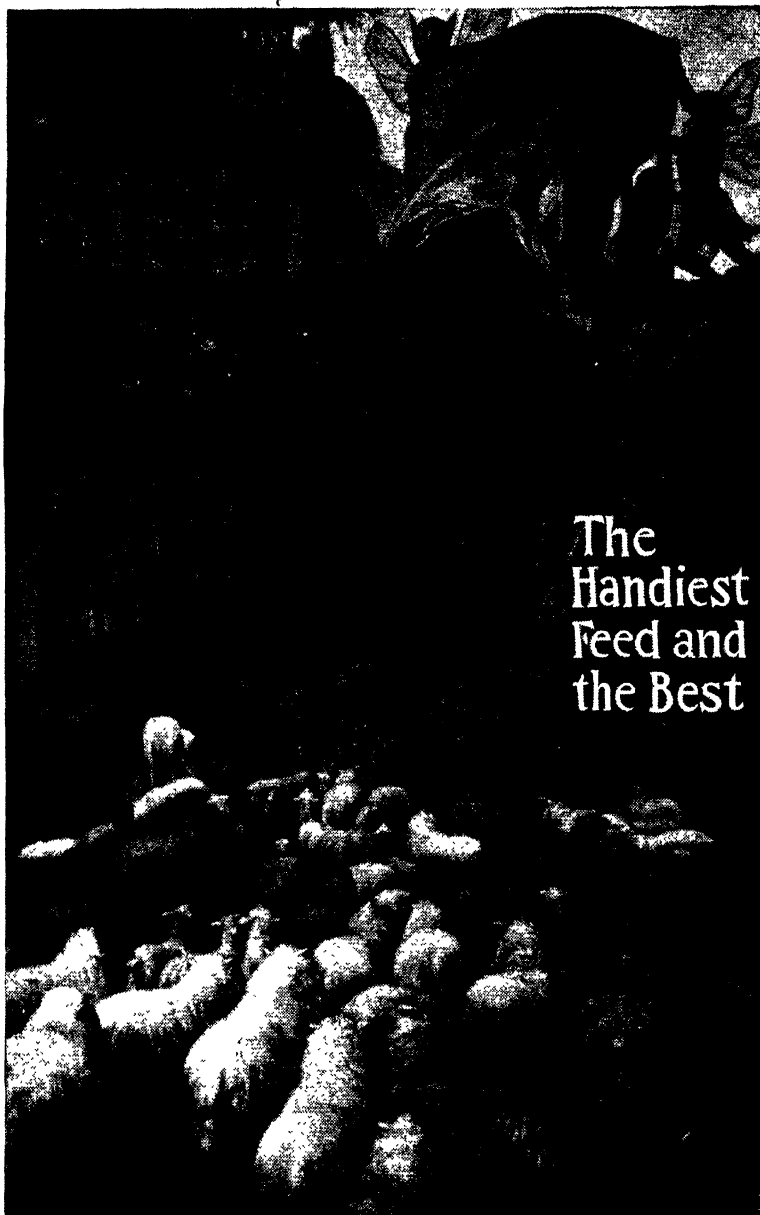
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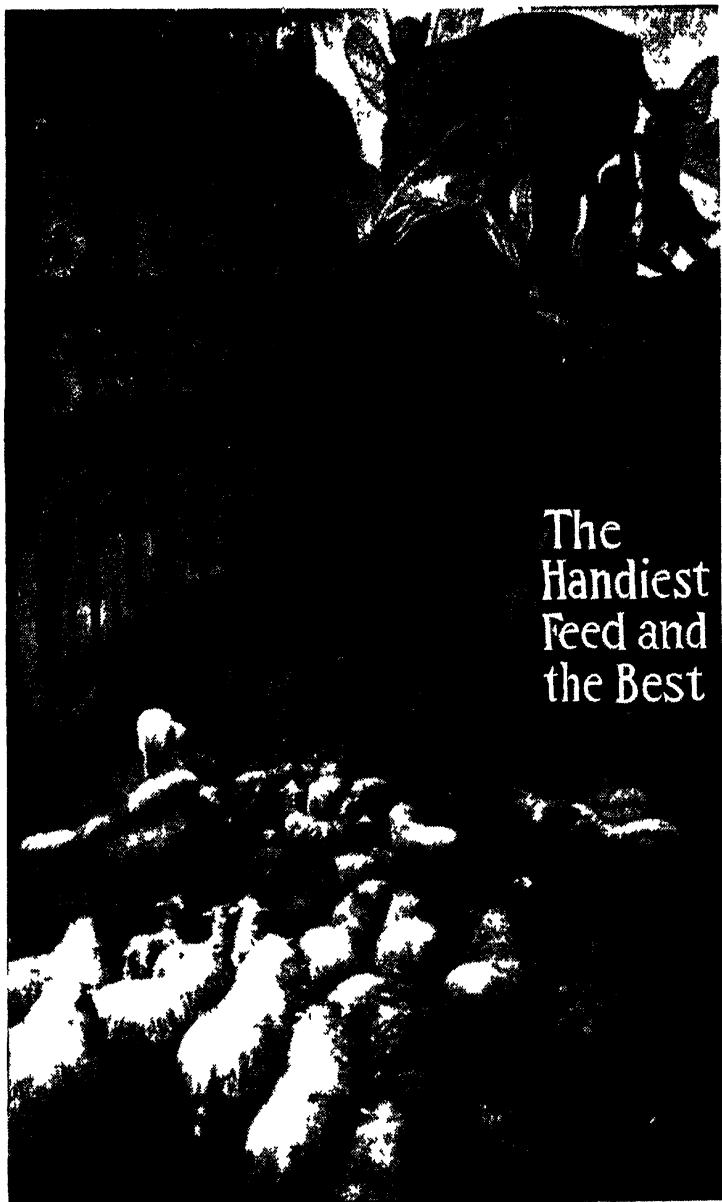
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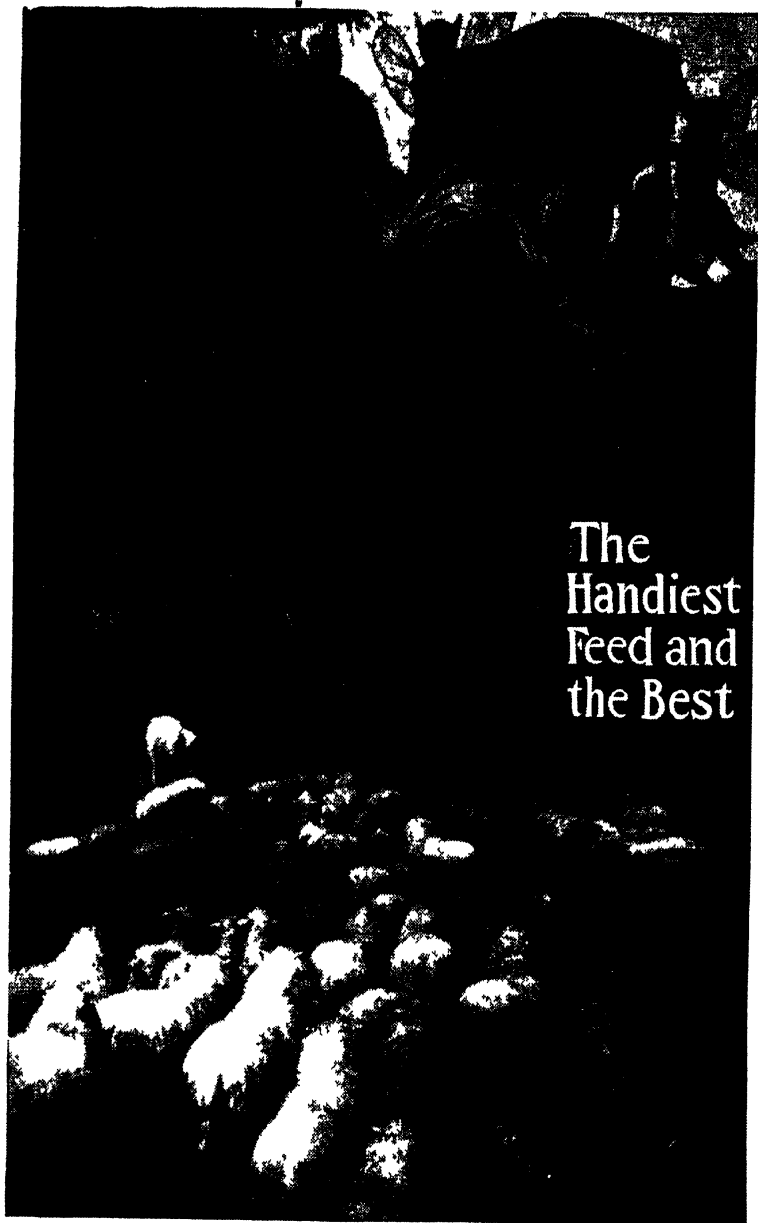
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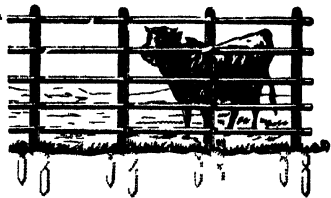
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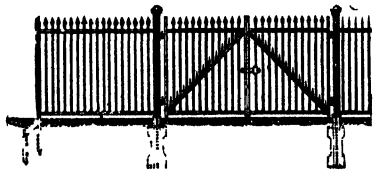
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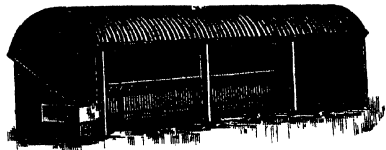
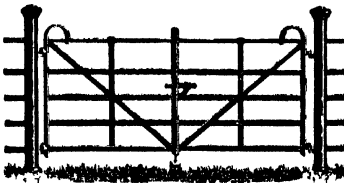
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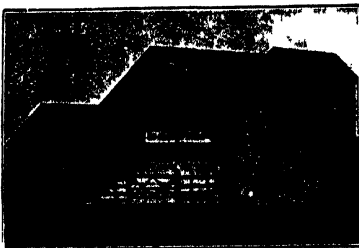
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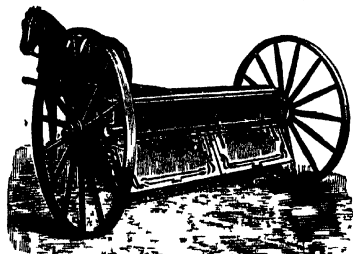
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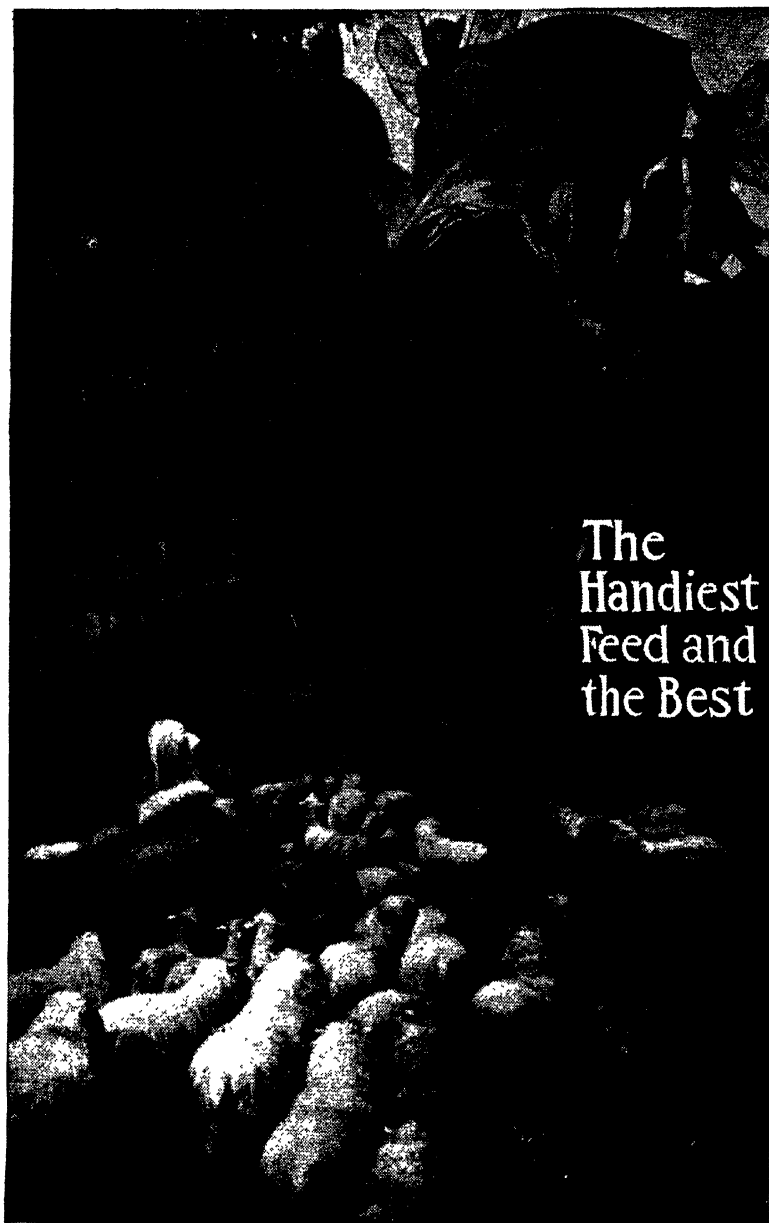
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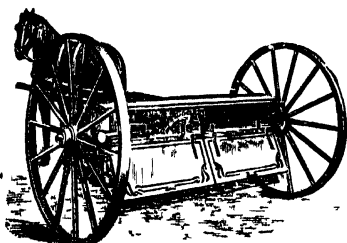
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THE JOURNAL OF THE BOARD OF AGRICULTURE.

Vol. XVI. No. 1.

APRIL, 1909.

THE FINANCIAL ASPECT OF SHEEP-WASHING.

BERNARD N. WALE, B.Sc.

Lecturer in Agriculture, South-Eastern Agricultural College, Wye

The desirability of washing sheep before shearing is a question on which the greatest divergence of opinion exists, and the average farmer, after reading through the literature of the subject in the agricultural publications of the last fifty years, would probably be as dubious about the matter as he was before. It may be instructive, therefore, in the first place, to recapitulate some of the more striking statements which have been made.

THE HISTORY OF THE SUBJECT DURING THE LAST HALF-CENTURY.—In the Royal Agricultural Society's Journal of 1855, John Wilson, late Professor of Agriculture, Edinburgh University, in an article on the "Various Breeds of Sheep in Great Britain with Special Reference to Wool," states (page 245): "It is the custom of the farmers in Devon not to wash the sheep before shearing them, and the wool being thus in the yolk or grease, is not so marketable as other kinds which are washed. . . . If the wool were washed and shown in the same way as in other districts, it would be readily saleable." It would thus seem that the practice of not washing was then getting a foothold in Devon, while in the remainder of the kingdom the custom was to wash, even Scotch Blackfaced being quoted for washed wool in the article just referred to.

Twenty years later, in the same Society's Journal for 1875, in an article by Earl Cathcart on "Wool in Relation to Science with Practice," the following statement is made (page 343): "It is quite true a great portion of the wool grown in Devon, Somerset, and Cornwall is sold in the grease, not having been washed on the sheep's back, and there is great difference of opinion amongst farmers about it. The buyers prefer it well washed, and it is more marketable: in consequence washing is becoming more general.

. . . The United States Agricultural Reports testify strongly to the same effect, viz., that wool should not be clipped in the grease, but well washed on the sheep's back." Earl Cathcart's article also includes a letter (pages 346-7) from the Secretary of the Bradford Chamber of Commerce, wherein washing is strongly recommended by the Committee of that body.

The next mention of washing sheep is found in the Royal Agricultural Society's Journal of 1878. In an article on "Practical Agriculture," Chap. IV., by John Algernon Clarke (pages 524-5), the writer states that "Sheep washing before clip day, though generally conducted in a primitive manner, has received greater attention of late years." Various methods of washing are next described, and the conclusion arrived at is that "as much as 2s. per tod (28 lb.) being the difference in value between well cleansed and badly washed wool, this extra carefulness in the process is found to pay." Note that the difference in price mentioned approximately equals 1d. per lb., and further, that this represents the difference in value between well and badly washed wool, and not between washed and unwashed, which would be much greater.

Ten years later, 1888, J. W. Turner, of Bradford, has an article in the same Journal on "Wool and its Uses," in which washing is recommended and described, and a reference is made to Earl Cathcart's paper of 1875 to correct an error made by that writer as to the injury done by using soft soap when washing sheep, and advocating the use of cold water only.

In the same Society's Journal of 1893, J. E. Hargreaves, writing from Kendal, Westmorland, has an article on

"Sheep-washing," wherein the opinion is expressed that washing sheep before shearing is a waste of time and labour, and as the writer is a wool salesman of some thirty years' experience, his dictum must have greatly assisted in bringing into fashion the method of marketing wool in the unwashed condition. He states: "If it is on account of the wool (that washing is done), I hope to be able to show that farmers are incurring an annual expenditure and giving themselves needless trouble, which in these bad times might be avoided. . . . My experience . . . is that unwashed British wool finds a readier market to-day than the washed wool. I have before me the views of several North Country farmers who have carefully tested the matter, and in every case, except one, the result to the grower has been advantageous. . . . If I was a farmer with clean grass land, I would never wash a sheep again." This opinion of Mr. Hargreaves will be referred to later.

Seven years afterwards, in 1900, the Journal of the sister Society—the Highland and Agricultural Society of Scotland—contains an article on "Wool Growing and Wool Showing," by Prof. John Scott, Edinburgh, wherein the writer advocates the earlier view that "sheep should be properly washed before shearing. With coarse, low-priced wools like the Scotch Blackfaced, it is different. They are chiefly used in carpet manufacture, and as colour is not so important there is less difference in the price of washed and unwashed in their case, than in the finer breeds of wool. But there is another good commercial reason why Scotch Blackfaced wool is not washed. Large quantities of it are exported to America, where carpet wools are admitted at a duty of $2\frac{1}{2}$ cents on wool costing less than 6*d.* per lb., and 5 cents on wool costing more than 6*d.* per lb. . . . All other sorts (of wool) exported to America are charged 10 cents per lb. duty, washed or unwashed, hence buyers who have 5*d.* per lb. duty to pay will pay it on wool and not on dirt."

There is here a new argument for washing in the case of the finer wools, viz., the duty the American buyer (and he is a very important buyer) has to pay for weight of material whether made up of wool or dirt.

Returning once more to the Royal Agricultural Society's

Journal. In 1902, there was an article on "The Production of British Wool," by Jonas M. Webb, where (page 413) the following note on washing is found: "The warmly debated question whether wool should be sold washed or unwashed is often raised among flockmasters, for if the wool is washed weight is lost, but an increased price per lb. is realised." The conclusion of a breeder was that "in a season when there is a good deal of yolk in the wool it is better for the farmer to sell his wool unwashed; but that in a season in which such yolk is deficient it may pay him to wash his flock."

Coming now to the *Journal of the Board of Agriculture*, and taking into account the shorter period of time during which this publication has been issued, a much greater constancy in advocating washing prior to shearing is found. Vol. VIII., June, 1901, contains an article on "The Handling of British Wool for Market," by J. W. Turner, who states (page 7): "It is probable, however, that the practice of leaving sheep unwashed may have given rise to some slipshod handling of wool in the past few years. It would be an unfortunate circumstance if the British woolgrower should, at a moment when competition is keenest, depart from the honoured practices of his predecessors, on the ground that there has been a fall in prices. . . . The argument that because prices are low the article ought to be neglected and less care given to it, is sufficient to produce a feeling of despair in the minds of those who are interested in the wool trade." Again (page 10): "Sheep should be washed in cold water without any soap."

In the *Journal of the Board of Agriculture* for 1907, Vol. XIV., there are two articles which contain references to washing:—

(1) In "The Preparation of Wool for Market" (page 96), it is stated that the need for greater care in preparing wool for market was emphasised at a meeting of the Home Wool Buyers' Association, held at Bradford in April, 1907. The Chairman of this meeting is reported to have said that "It was to the interests of the grower to have his wool got up for the market in the best possible shape. By this he meant it should be washed in the best style practicable, that it

should be properly cleaned, have all the dockings clipped off the fleeces, and be kept as free from straws and sticks as possible. . . . Many farmers in getting up their wool seemed to be under the impression that they would get as much for it if it was prepared for the market in a slovenly manner, as they could by getting it up in a workmanlike and careful style. This was a mistake, as farmers' wool would always command a price commensurate with its condition and cleanness. . . . There were many classes of our home-grown wools which Americans could not buy because of the slovenly way in which they were sent to the market."

(2) "Preparation of Wool for Market" (page 241). The Home Wool Buyers' Association have issued suggestions to woolgrowers, among which is found: "Washing—Sheep to be carefully washed and clipped within ten or twelve days after washing, otherwise the wool cannot fairly be sold as washed. Sheep should be properly daggged before washing, as the manure not only discolours the water, but damages the fleece."

The most up-to-date and comprehensive view as to the continuance or abandonment of the practice of washing in the different districts of Great Britain is to be found in a "Report on the Production of Wool in Great Britain in 1905 and 1906," by Mr. R. H. Rew, published by the Board of Agriculture and Fisheries. This report ought to be in the hands of all flockmasters, as much valuable information is given in it. From that report it is possible to arrange Great Britain into three well-defined areas, where: (a) "Washing is generally practised"; (b) "About half the wool is washed"; (c) "Washing little done or not at all."

(a) *Washing Generally Practised*.—This district in England lies north of a line drawn from Bristol to Norwich, and includes the whole of the middle of England and the North with the exception of Northumberland, where a large number of Blackfaced sheep are found, which are unwashed: The whole of Wales also falls under (a).

(b) *About half the Wool Washed*.—The area where this description holds good extends on either side of a line drawn in a somewhat south-westerly direction from Ipswich in Suffolk to Wellington in Somerset, and includes the counties

of Suffolk, Essex, Herts, Bucks, Middlesex, Oxford, Berks, Wilts, Hants, and Somerset.

(c) *Washing little done or not at all.*—This includes two small districts—the extreme S.W., viz., Devon and Cornwall, and the County of Surrey.

Now, on reference to a geological map, it will be seen that a large portion of the districts (b) and (c) lies on the Chalk, and the paucity of water on this formation, and its extreme hardness where found, provides one likely reason why washing is so little practised, as indeed was explained to the writer in the case of Surrey. It will not, however, explain why washing is so little practised in Devon and Cornwall. In the report above referred to, washing is specifically described as becoming a decreasing practice in the counties of Cambridge, Herts, Norfolk, and Oxford.

In Scotland practically the opposite is the case to what was found in England. With the exception of a district in the South, bounded by a line running parallel to the Border, and some 20 or 30 miles from it, and another small district in the extreme North, including Caithness, Sutherlandshire, Ross and Cromarty, the great bulk of Scotland shears its sheep in the unwashed condition.

The districts where (a) "Washing is Generally Practised" are two—the extreme North—Caithness and Sutherlandshire, and in the South, Berwick and Dumfries (except Blackfaced sheep), while (b) where "About half the wool is washed" includes districts bordering on the two mentioned under (a), viz., Ross and Cromarty in the North, and Haddington, Roxburgh, and Kirkcudbright in the South.

The same report places the percentage of unwashed wool in the total clip for Great Britain at 28 per cent., *i.e.*, 952,000 fleeces unwashed, out of a total of 3,348,000 fleeces, but it adds that the general impression given by an examination of the growers' returns would suggest that the proportion of unwashed wool is larger than is thus indicated. There is evidence of a tendency in recent years to discontinue the practice of washing."

In the *Agricultural Gazette* published as recently as last summer (1908) there was an editorial article on "Sheep Washing," from which the following is taken. "Not many years ago 'unwashed' was an exceptional description of

lots on sale catalogues, but in some districts this is more true of washed wool. Some pertinent reasons for abandoning the time-honoured . . . pastoral operation of washing sheep have been placed before flockmasters, and accepted by most of them as conclusive."

The disadvantages of washing, given in the article above referred to, will be dealt with later. The statement contained in the concluding part of the last sentence appears, however, much too drastic in the light of the figures just quoted from Mr. Rew's report.

RECENT WOOL SALES.—Sufficient references, portraying much diversity of opinion, have been given to show that flockmasters may well be very doubtful as to the advantages of washing sheep. It was on this account that the writer, after attending the annual Wool Sale held at Guildford last July, set about gleaning information which should give a decisive answer to this much-debated question. Owing to the courtesy of Mr. Fred Lee, of Messrs. Hewett and Lee, of Guildford, whose assistance in connection with all the figures in this article the writer gratefully acknowledges, the weight of each lot of wool was obtained, the prices per lb. being secured at the time of sale, and corroborated later by reference to Messrs. Hewett and Lee's books. The Catalogue of Sale contained a detailed account of the number of fleeces, whether washed or unwashed, and the age, sex, and breed of sheep from which the different lots of wool were clipped. By means of these data the total number of fleeces, say, of washed wool of any particular class of sheep, and their weight were arrived at. By dividing the total number of lbs. of this wool by the number of fleeces, the average weight of each washed fleece was obtained. This weight, multiplied by the average price realised, gave the average value of the washed fleece. Similarly the average value of the unwashed fleece was got at. In this way the value of the fleece (or per head of sheep) for several breeds and ages of sheep which were represented at Guildford, was estimated. These figures are shown in Table I. Where the description in the Catalogue of any lot of wool appeared to be inadequate, or where mixed wools were put up in one lot, the figures have been discarded altogether so as to eliminate possible errors arising from these sources.

TABLE I.—YEAR 1908.

Breed, Age and Sex of Sheep		Washed or Unwashed	Number of Fleeces	Total Lbs of Wool	Lbs per Fleece	Price per lb	Value per Fleece	Increased Value per Fleeces for Washing
						d	d	d
Southdowns	Ewes	Washed	2,114	8,833	4 17	10 40	43 36	} 5 95
		Unwashed	2,048	10,572	5 16	7 25	37 41	
	Tegs	Washed	521	2,834	5 43	10 50	57 01	} 11 59
		Unwashed	1,648	11,200	6 79	6 69	45 42	
Hampshires	Ewes	Washed	58	320	5 51	8 50	46 83	} 9 72
		Unwashed	431	2,544	5 90	6 29	37 11	
Kents	Ewes	Washed	520	3,122	6 00	7 33	43 98	} 10 86
		Unwashed	89	576	6 47	5 12	33 12	
Exmoors	Ewes	Washed	25	100	4 00	10 00	40 00	} 6 21
		Unwashed	325	2,081	6 40	5 28	33 79	
Scotch								
	Ewes and Tegs	Washed	567	3,312	5 84	5 75	33 58	} 6 21
		Unwashed	153	986	6 44	4 25	27 37	
Crossbreds	Ewes	Washed	190	979	5 15	8 12	41 81	} 5 13
		Unwashed	402	3,061	7 61	4 82	36 68	
Totals			9 091	50,520				
Average								7 81

The above figures show that by washing sheep before shearing an increase of from 5d. to 11½d. per fleece was obtained, or an average of 7½d. per fleece over the whole sale of some 9,000 fleeces, representing over 50,000 lb. of wool. In addition to the breeds above enumerated, wool from Devons, Mashams, Suffolks, Cheviots, and Dorsets was also on sale at Guildford, but in insufficient quantity to classify it into washed and unwashed lots. The statistics given are based on approximately 75 per cent. of the total wool offered at this particular sale. The very high increased value for washing, indicated by the figures shown above, suggested that 1908 might have been an exceptional year, and bearing in mind one of the commoner excuses for not washing sheep, viz., "because it doesn't pay when wool is low in price," it was resolved to investigate prices made when wool was almost at its lowest in recent years, and for this purpose the year 1901 was selected, although it was subsequently found that during the following year—1902—wool touched its lowest, being about ¼d. per lb. cheaper than in 1901. Again, the figures for the year 1904 were also investigated, as in that year prices ruled very similarly to those of the year 1908.

TABLE II.—YEAR 1901.

Breed, Age, and Sex of Sheep		Washed or Unwashed	Number of Fleeces	Total Lbs of Wool	Lbs per Fleece	Price per lb	Value per Fleece	Increased Value per Fleece for Washing
						<i>d</i>	<i>d</i>	<i>d</i>
Southdowns	I wes	Washed	1,945	7,706	3 96	7 72	30 57	} 3 45
	"	Unwashed	1,783	11 632	6 52	4 16	27 12	
	Tegs	Washed	307	1,765	5 74	7 66	43 96	} 16 73
	"	Unwashed	729	5,337	7 32	3 72	27 23	
Hampshires	Tegs	Washed	87	473	5 43	6 50	35 29	} 3 39
	"	Unwashed	369	3,074	8 33	3 83	31 90	
Crossbreeds	Fwes	Washed	212	1,261	5 94	6 00	35 64	} 6 27
	"	Unwashed	1,457	11,073	7 59	3 87	29 37	
	Tegs	Washed	290	1,680	5 79	5 50	31 84	} 4 40
	"	Unwashed	232	1,629	7 02	3 91	27 44	
Totals			7,411	45,630				
Average								6 85

The above table shows that in the year 1901 there were nearly 7,500 fleeces, representing 45,000 lb. of wool, on which the statistics are based, and the advantage of washing works out at $6\frac{1}{2}d.$ per fleece. The figures indicate a greater variation than those of 1908, in that the advantage for washing ranges from $3\frac{1}{2}d.$ to $1s. 4\frac{1}{2}d.$ per fleece.

Besides the breeds mentioned in Table II., the following were represented, but only either in the washed or the unwashed condition, and not in both. Devons, Suffolks, Dorsets, Kents, Scotch, Exmoors, and Spanish.

TABLE III.—YEAR 1904.

Breed Age and Sex of Sheep		Washed or Unwashed	Number of Fleeces	Total Lbs of Wool	Lbs per Fleece	Price per lb	Value per Fleece	Increased Value per Fleece for Washing
						<i>d</i>	<i>d</i>	<i>d</i>
Southdowns	Lwes	Washed	2,067	9,002	4 35	11 06	48 11	} 0
	"	Unwashed	1,757	10,548	6 00	8 02	48 12	
	Tegs	Washed	391	2,096	5 36	11 41	61 15	} 4 27
	"	Unwashed	762	5,371	7 04	8 08	56 88	
Hampshires	Lwes	Washed	91	509	5 59	10 62	59 36	} 4 10
	"	Unwashed	346	2,436	7 04	7 85	55 26	
Crossbreeds	Lwes	Washed	53	334	6 30	9 50	59 85	} 1 13
	"	Unwashed	52	382	7 34	8 00	58 72	
Totals			5,519	30,678				
Average								2 37

In addition to the above the other breeds represented, but with washed or unwashed wool only, were Scotch and Exmoors.

As far as numbers are concerned, the year 1904 (a high-priced year) is the least satisfactory, there being 5,500 fleeces against 7,500 in 1901, and 9,000 in 1908. This is still better shown by reference to the total weight of wool, of which there were 30,000 lb. in 1904, 45,000 lb. in 1901, and 50,000 lb. in 1908. This year shows the smallest difference in value between the washed and unwashed fleece, though even here it is considerable on the average, viz., $2\frac{1}{3}d.$ higher for the washed fleece.

Strange to say, at the 1904 sale, the value of the washed and unwashed fleeces from the Southdown ewes was approximately the same—just over 4s. These figures, however, are to be relied on, for on reference to the prices per lb. given for the separate lots, the extreme limits of variation are very small, being only from $10\frac{1}{2}d.$ to $11\frac{3}{4}d.$ per lb. in the case of the washed wool, and only from $7\frac{1}{2}d.$ to $8\frac{3}{4}d.$ for the unwashed. It is, however, a very exceptional case, for out of the sixteen examples given in the three tables above, and taken indiscriminately from any three years, this is the only one which shows no advantage for washing.

Grouping together the increased values obtained during the three years, an average increased value of $5\cdot67d.$ per fleece for washing, is obtained. (See Table VI.)

In Table No. IV., on the next page, the total numbers of washed and unwashed fleeces of the different breeds are given for the three years. These figures are larger than the figures given in Tables I., II., and III., because lots of wool which were either washed only or unwashed only are included.

From that table it will be seen that over 58 per cent. of the sheep in the Guildford district are shorn in the unwashed condition.

There are a large number of factors influencing the amount of loss in weight a fleece undergoes by washing, the principal one being, not the grease, but the amount of dirt contained in the wool; this will naturally be greater in the case of the long-woolled breeds than in the short-woolled ones, and very much greater where sheep are folded on arable land in dirty weather than where the natural lair is a clean pasture.

TABLE IV.—SUMMARY OF YEARS 1901, 1904, AND 1908.

Breed, Age, and Sex of Sheep.	Number of Fleeces Washed.	Number of Fleeces Unwashed.
Southdowns : Ewes	6,126	5,628
Tegs	1,219	3,189
Hampshires : Ewes	149	777
Tegs	87	640
Kents : Ewes	520	201
Tegs	339	0
Exmoors : Ewes and Tegs ..	25	534
Scotch : " " "	567	470
Crossbreeds : Ewes	586	2,113
Tegs	290	633
Devons : " " "	0	106
Mashams : " " "	129	0
Cheviots : Ewes	80	0
Suffolks : Tegs	17	301
Dorsets	184	71
Spanish	0	27
Totals	10,318	14,690
	25,008	

The actual loss per cent. due to washing is shown in the Table below.

TABLE V.

Breed, Age, and Sex of Sheep.	Percentage Loss in Weight by Washing			
	1901.	1904.	1908	Average
Southdowns : Ewes	39'27	27'50	19'19	28'65
Tegs	21'59	23'87	20'03	21'83
Hampshires : Ewes	—	20'60	6'62	13'61
Tegs	34'82	—	—	34'82
Kents : Ewes	—	—	7'27	7'27
Exmoors : " " "	—	—	37'50	37'50
Scotch : " " "	—	—	9'32	9'32
Crossbreeds : " " "	21'74	14'17	32'33	22'74
Tegs	17'95	—	—	17'95
Average ... ..	...	...	...	21'52

The shrinkages show very great variations, but the average is one which is generally accepted, viz., 20—25 per cent.

It would appear that the buyer having found out by previous experience how enormous the variation is, takes good care to safeguard himself when he is dealing with unwashed wool.

OBJECTIONS TO WASHING.—The objections generally raised

against washing sheep are:—(1) The cost. (2) Damage done to nursing ewes, fat sheep, and sheep in very low condition in the way of contracting chills, which may result fatally; and occasional cases of drowning. (3) When prices are low the difference between washed and unwashed wool is not considered sufficient to pay for the trouble and risk involved. (4) Common wash pools are undesirable because of the liability of sheep being exposed to infection by such diseases as scab and foot-rot.

FINANCIAL ASPECT OF WASHING.—(1) *The Actual Cost.*—This works out in average cases to a very small figure per head, and probably rarely exceeds $\frac{1}{2}d.$ per sheep. The estimates of two practical farmers, one from Kent and one from Leicestershire, are given below. They have both placed the number of sheep washed per day low, so as not to underestimate the cost. The Kent example shows 400 sheep washed per day by three men:—Shepherd at 3s.; two labourers at 2s. 9d.=5s. 6d.; total, 8s. 6d.

There is also a charge of 1d. per score for the use of the tun (the circular bricked bath found on several farms in most parishes in the district); but this charge would not apply where the flockmaster had his own tun; however, perhaps a small sum should be charged in such a case for interest and repairs. One penny per score=1s. 8d. on the 400 sheep. This added to 8s. 6d. gives 10s. 2d. as the total cost of washing 400 sheep, which works out to 0'30d. (*i.e.* approximately $\frac{1}{3}d.$) per head.

The Midland example takes 550 sheep washed as a day's work, and it must be remembered that here the bath is generally larger—formed by damming up a stream, or using part of a pond—hence more sheep can be "in soak" at one time, and they consequently require less time in the shepherd's hands; but these 550 sheep require four attendants instead of three, as in the previous case. Shepherd, at 3s.; two labourers at 2s. 9d.=5s. 6d.; one youth at 2s.; total, 10s. 6d. Threepence per score for use of wash-place, if not on the farm, is sometimes charged when there is a common wash for one or more parishes. This, on 550 sheep=6s. 10 $\frac{1}{2}d.$ —making a total of 17s. 4 $\frac{1}{2}d.$, which works out to 0'37d. pence, or just over $\frac{1}{3}d.$ penny per head.

The figures given in the above two examples, representing the number of sheep washed per day, may be rather low where washing is done on the farm, but they allow for time taken up in driving the sheep to and from the wash-place, situated perhaps a mile or more away.

(2) *Damage done to Sheep, sometimes with fatal results.*—Men who make a practice of carefully washing their sheep year by year state that loss under this head is very small.

In case of nursing ewes, care should of course be taken not to wash with prevailing east winds; sheep should be fasted several hours before washing; they should not be overdriven either to or from the wash-place. With regard to cases of drowning this would generally be regarded by practical men as due to gross carelessness on the part of the men in charge.

In discussing the objections under this head with flock-masters, the consensus of opinion seems to place such loss altogether at about one sheep out of 500.

Putting the average value of this sheep at the rather high figure of 50s. (for the sheep likely to be lost from this cause would probably be a weakly one), the loss on this score works out to 1'2d. per head. This will bring the total cost under (1) and (2) to 1'5d. Hence 1½d. per head of the flock will cover cost and risk.

(3) *Whether it pays to wash when prices are low.*—This has been fully worked out in the case of the low-priced year of 1901 (Table II.), for one locality, viz., Guildford. The average increased value of fleece for washing during this year was 6'85d. Deducting from this the costs and risk 1'5d., there is left a profit of 5'35d. per fleece, which on a flock of 500 sheep means a sum of £11 2s. 11d. as the total profit, or £6 13s. 9d. on a flock of 300.

It is interesting to notice in this connection that washing paid the farmer considerably better in the low-priced year of 1901 than in the high-priced year of 1904.

(4) *Liability of flocks to contract contagious diseases at common wash-pools.*—The risk in the case of scab is not very great, considering the restrictions in force in an infected area, and in the case of there being no wash-place on the farm, the probability is that with scab prevailing at shearing

time, such flock would then have to be shorn in the unwashed condition. With foot-rot the case is not so free from danger, but by walking the sheep over freshly slaked lime, or through a bluestone trough on their return from the wash, the risk from this cause would be reduced to a minimum.

THE ADVANTAGES OF WASHING.—These are several, and placed in the order of importance are:—

(1) *Increased Value obtained per fleece.*—This often leaves a very substantial profit. It has already been shown what this amounted to for a flock of 500 sheep in 1901. But a fairer result is obtained by taking the averages of the three years investigated, as shown in Table VI. below.

TABLE VI.

Year	Increased Value (in pence) per Fleece by Washing	Profit (in pence) per Fleece, after deducting cost and risk at 1½d per head
1901	6 85	5 35
1904	2 37	0 87
1908	7 82	6 31
Average	5 67	4 17

The average profit per fleece is thus found to be 4·17d. per head, and 4·17d. per head on a flock of 500 sheep results in a total profit of £8 13s. 9d., or of £5 4s. 3d. on a flock of 300 sheep. In the case of the year 1908, the profit per head of 6·31d. works out to no less a sum than £13 2s. 11d. on a flock of 500, or £7 17s. 9d. on 300.

If a selection be made of special classes of sheep as, e.g. Southdown tegs (Table I.), it is seen that the profit in this case would be considerably higher, viz., £24 2s. 11d. for a flock of 500 sheep, or £14 9s. 9d. for one of 300.

With such favourable results there should be little hesitancy in washing sheep, and farmers will reap the benefit of renewing the practice of washing where it has been abandoned. Nor need those farmers who have never relinquished the practice of washing fear that if washing becomes general the price of wool will come down, for the clip of the British Isles supplies little more than one-fourth (viz., 27 per cent.) of the total home consumption, which for the

year 1906 was approximately 493,000,000 lbs., while our home sheep produced 133,000,000 lbs. only.

(2) *Wool, when washed, is more attractive to the buyer.*—In other words, competition for it is keener; this was very noticeable at the Guildford sale last year, for when specially clean lots were put up there was much more spirited bidding.

As in any business, the man who makes his wares the most attractive commands the readiest sale for them. The Canadian system of grading fruit for market, whereby uniformly even and clean fruit has displaced to a considerable extent home-grown, carelessly packed, and non-graded fruit, may be mentioned as an example.

One point the farmer should remember in this connection, and that is, the wool-buyer knows infinitely more about wool than he does, owing to the fact that the farmer generally sees his and his neighbours' clips but once a year, while the buyer has wool passing through his hands almost every day in the week at certain seasons of the year. It stands to reason, therefore, that the farmer is not going to gull the buyer by selling dirt in the fleece, which the former thinks the latter will mistake for wool. The buyer will make an accurate estimate of the amount of loss the wool will suffer when bought in the unwashed condition. It would appear also that the buyer having been "once bit" is "twice shy," or how is the substantial difference in price between the washed and the unwashed fleece accounted for? As already stated, the buyer, knowing the great variation in the amount of dirt contained in unwashed wool, makes ample provision for safeguarding his own interests.

(3) *Fewer buyers for unwashed wool.*—This is another reason for less competition. Mr. Rew's report, already referred to, contains this comment from a wool-buyer. "The desirability of washing is insisted upon, and one buyer observes that farmers limit their market by offering the wool in the grease, as the majority of spinners and manufacturers will not buy wool in that state." Another observes that "the omission to wash is an unwise and indolent habit, which sooner or later will prove most disadvantageous to farmers' interests." The figures already given afford sufficient corroboration of this last very pregnant sentence, and

show that the time has already arrived when omission to wash is proving "most disadvantageous to farmers' interests."

Before leaving this item a few quotations from the Board of Agriculture and Fisheries' "Weekly Report on Market Prices" of July last in reference to wool should be noticed.

"*Edinburgh*.—The American demand is helping washed wools only."

"*Salisbury*.—Bidding very brisk, especially for washed wools."

"*Hungerford*.—Hampshire Down ewe and teg mixed made from 10½d. to 11d. washed, and 6½d. to 7½d. unwashed." (The difference between the two prices here is sufficiently large to show the great advantage that would accrue from washing, especially if reference be again made to Table L.)

"*Newbury, Wallingford, and Didcot*.—(Prices similar to those given for Hungerford.)"

"*Marlborough*.—Prices for washed were fully maintained, but unwashed was a shade easier."

On the other hand, the only reference making favourable mention of unwashed wool is given as an afterthought in the report for Newbury: "One special lot of unwashed ewe wool made 8d."; this surely is "the faint praise that damns."

(4) *Greater difficulty in removing dirt from the fleece after it is shorn*.—It is more difficult to cleanse the shorn fleece than when it is growing on the sheep's back, hence it probably costs more for the buyer to clean it than the seller. Of course it must not be overlooked that all wool, whether bought in the grease or washed, undergoes scouring before it is spun into yarn; but it is not the removal of the grease so much as the dirt and grit that it is the farmer's business to attend to. There is, however, a chance of the wool containing too much grease after washing, as when a too prolonged interval is allowed to elapse between washing and shearing. The average time is generally reckoned at about ten days, but a week would be sufficient in hot weather, with the sheep in good condition, whilst a fortnight might not be too long in the case of cold weather, and with sheep in poor condition. In any case it should be remembered that the buyer is the better judge as to the amount of grease

present, and it is not likely that the farmer will succeed in selling him grease for wool, even if he intended doing so.

(5) *Where wool is washed, the cost for carriage per lb. of actual wool is less.*—Whether 100 lb. of wool contains 2 or 30 lb. of dirt, the railway companies' charge on the actual 70 lb. of wool in the latter case is exactly as much as they charge for the 98 lbs. in the former case. Thus the actual freight on wool bought in Cornwall to go to Bradford, or say at Guildford to go to Huddersfield, may mean a considerable increment on the price per lb. actually given at the sale, especially where such wool is in the unwashed condition; hence the buyer gives a sufficiently low price to allow for this. In the extract from Mr. Hargreaves' article on "Sheep-washing," Royal Agricultural Society's Journal, 1893, already given (p. 3), the last sentence quoted shows that the wool generally dealt with around Kendal is clipped from sheep which spend the whole of the year on grass; and if clean grass land formed the lair for all sheep, there might not be so great an advantage in washing them, as in that case the amount of dirt present would be fairly uniform; but when the rule in many districts is for sheep to be on the arable land all the year round, or at any rate during the winter months, those sheep whose lair is the wettest, and the soil of which is the stickiest, will naturally collect a larger amount of foreign matter in the wool than those lying on a drier and more porous soil, hence the great variation in the amount of dirt found in the wool of sheep on different kinds of soil.

In Scotland, as already mentioned, the bulk of the wool is unwashed, probably for two reasons: first, that a large proportion of the sheep are grass-fed all the year round, and, secondly, that a very large proportion of the sheep are Black-faced Scotch, which clip a very inferior quality of fleece, the character of the wool being such that it can only be used for the coarser class of yarns; as already mentioned, it is largely used for carpet manufacture, and goes from this country to America as "carpet wool." The price of this wool was quoted last July in Inverness at $4\frac{1}{2}d.$ unwashed, while unwashed Hampshire, for example, was making $8d.$ If the $4\frac{1}{2}d.$ Blackfaced wool were washed it would tend to

bring its value up to 6*d.*, when double the duty—viz., 5 cents per lb., would be charged on it if sent to America, and thus it would cost the buyer 8½*d.* per lb., against unwashed 4¼*d.* + 2½ cents (1¼*d.*) = 5½*d.*, and 5½*d.* unwashed will be much cheaper than 8½*d.* washed, as may be gathered from Tables I., II., and III.

In districts where the sale of wool is effected through local staplers, *i.e.*, by the latter paying visits to the farmer and purchasing his wool on the spot, the necessity for getting up the commodity in a clean and attractive manner is not perhaps so obvious; but where the, in many cases, more advantageous system of marketing wool obtains by selling by auction at local wool sales, the greatest care in preparing it for market is a *sine quâ non* if top prices are to be realised.

THE POULTRY INDUSTRY IN GERMANY.

Among European countries, Germany possesses, so far as is known, the largest total number of poultry, though not the largest number per acre. The following table, taken from the Agricultural Statistics, 1907, Part IV., gives particulars for the six countries which have published returns on this subject.

The scope of the returns varies, but generally speaking they are confined to poultry kept on farms, and do not include those kept in towns or by persons occupying only small quantities of land attached to their residences.

	Year	In Thousands			
		Fowls	Geese	Turkeys	Ducks
Denmark	1903	11,555	188	58	889
France	1892	54,103	3,520	1,968	3,684
Germany	1900	55,396	6,239	351	2,467
Ireland	1908	17,663	1,838	1,051	3,477
Netherlands	1904	4,935	34	11	433
Norway ..	1900	1,640	7	4	8

It will be seen from this that according to the latest returns, now some nine years old, Germany possessed 55,396,000 fowls, 6,239,000 geese, 351,000 turkeys, and 2,467,000 ducks. In the case both of France and Germany, the figures repre-

sent about one head of poultry to every two acres, while in Denmark the proportion is 1'33 and in Ireland 1'15 per acre.

The importance of the industry in Germany has induced the State authorities in recent years to take steps to encourage utility poultry keeping, and with the view of ascertaining the position in various parts of the Empire, the German Agricultural Society has recently conducted an exhaustive inquiry,¹ which gives detailed particulars for every State and Province separately. It may be said that the official recognition of the poultry industry in Prussia only dates from 1898, though several States and Provinces gave some attention to the subject before that date. The expenditure from public funds during the last nine or ten years in the whole of Germany has amounted to £59,800, of which about £47,250 has been spent in Prussia. In 1907 the total outlay was £7,900. Generally speaking, the assistance takes the form of grants for more or less definitely defined objects distributed through the Agricultural Chambers and Central Agricultural Societies, and the expenditure is supplemented by grants from the funds of the Chambers themselves.

The steps actually taken in each Province vary, but the following description gives an account of some of the different methods of fostering the industry which have been adopted.

Poultry Breeding Stations.—The most popular type of assistance in Germany is what is called the Poultry Breeding Station. With the assistance of the Chambers of Agriculture and similar bodies, no less than 2,995 of these centres have been established, and they are to be found with few exceptions in all parts of Germany. The object aimed at is the introduction of pure-bred fowls of breeds specially adapted to the district with the view of raising the standard of poultry kept by the ordinary farmer, and this is done by distributing either eggs or chickens from these local centres. The method adopted varies slightly in detail in different parts, but the system in East Prussia may be given as an example.

Small holders and others are selected, to whom a stock of one cock and six hens is supplied free, on condition that eggs for sitting not required for use on the holding are supplied to

¹ Die Massnahmen zur Förderung der Nutzgeflügelzucht in Deutschland Arbeiten der D. L. G. Heft 145.

other persons at the rate of 1½*d.* each. Fowls of other breeds are not to be allowed to run with them. This stock remains the property of the Chamber until the holder has returned in September of the following year the same number of early-hatched chickens. In many cases, however, the stock remains the property of the Chamber for two and even three years, and the conditions are more complicated. The right to purchase the chickens at 25 per cent. above the current price for ordinary chickens is sometimes reserved, records of production are required to be kept, and birds may be required to be exhibited at local shows. The method of feeding and housing is frequently defined, and the holder is required to hatch a certain number of the eggs between 1 March and 30 June. The number of fowls supplied is probably on the average one cock and ten hens.

Small holders are also sometimes supplied with two or three pure-bred birds, merely on condition that the same number of chickens are returned at a later date.

Poultry Breeding Centres.—Supplementary to these "breeding stations" are a number of larger centres and model poultry farms, as well as several extensive institutions in East Prussia, Pomerania, Brandenburg, Saxony, the Rhine Province and Upper Bavaria, which are expressly intended for educational purposes and experimental work. These generally serve also as the headquarters for the district, supply the fowls for the breeding centres, and in other ways endeavour to promote the poultry industry.

The East Prussian Institute at Waldgarten, near Königsberg, covers an area of 15 acres, and forms part of the Experimental Station belonging to the Agricultural Chamber. Incubation and rearing take a prominent place in the curriculum, but all branches are taught. The Institute has eight incubators capable of taking 2,240 eggs, and complete rearing apparatus, as well as extensive poultry houses on the most approved principles. In order to avoid the introduction of diseases, no live fowls are ever brought in, fresh blood being introduced by means of eggs. In 1907, 5,273 eggs were hatched, and the chickens were distributed either direct from the incubator or at six weeks old, while some were retained to supply the breeding stations established by the Chamber.

The breeding stocks consisted of 12 cocks and 208 hens, with some ducks and geese. Instruction is given from May to November, the courses lasting from one to six weeks, and the fee varying according to the period from 10s. to 20s. Experiments are carried out in feeding and fattening, the productive qualities of different breeds are tested, and various machines and implements are tried.

Another type of a Central Poultry Farm which may be mentioned is the Poultry Breeding Institute at Crollwitz, Halle a.S., which is not primarily educational, though courses in feeding, killing, and dressing are held. The main object is the distribution of eggs and birds with a view to raising the level of the poultry industry in the Province of Saxony. The establishment covers 15 acres, and the buildings were erected in 1900 at a cost of £3,000. Some 750 head of poultry are kept, and about 12,000 eggs and 2,000 young birds are distributed annually. Experiments are carried on, and the Institute is open for inspection, about 800 persons visiting it annually.

The Poultry Breeding Institute at Erding, in Bavaria, is similar to the above, but its experimental and educational side is rather more developed. About 500 head of poultry were kept, and 27,000 eggs were distributed in 1907. The courses extended over a week or ten days.

In addition to these large institutions there are over 300 model poultry farms and breeding stations, which exist partly for purposes of instruction but chiefly as centres from which the fowls required for the small "breeding centres" are obtained.

As in the case of the small breeding centres the actual cost to the Agricultural Chamber is very small, the station being a private enterprise carried on under conditions laid down by the Chamber. For example, in the Province of Hesse-Nassau, there were 19 stations managed on the following lines. A stock of fowls is supplied in the first place by the Chamber to a selected poultry farmer, who for his part provides additional approved birds, while new blood is introduced from time to time at the cost of the Chamber. The holder undertakes a system of trap-nests so that the number of eggs laid annually by each bird is recorded, and hens

over two years which are not laying 130 eggs annually are killed and replaced, the Chamber contributing 2s. 6d. per bird towards the cost. The original stock is separated from the other birds from the beginning of February to the end of July and provided with proper runs, &c.; all eggs laid by this stock are hatched as far as possible on the farm for the purpose of supplying the requirements of the Chamber, which undertakes to pay 5s. for each hen at nine months, and 7s. to 10s. for each one to two year old cock. Eggs which cannot be hatched at the station are disposed of to other breeders. Careful accounts are required to be kept, and if the management is satisfactory a grant of 50s. or upwards is made annually.

Model Poultry Farms are, as the name implies, intended to show local farmers how poultry should be kept, though the distribution of eggs and young birds is regarded as equally important. Farms of private holders are usually selected, and a small premium paid on compliance with the conditions.

No complete figures can be given of the distribution of eggs from all these local centres, but it must undoubtedly be very large, and it can hardly have failed to have effected a material improvement in the breeds of poultry usually kept.

Other Forms of Assistance.—Besides the instruction given at the central institutions referred to above, lecturers and instructors are maintained in most districts, who, in addition to giving lectures and holding meetings, carry out the arrangements for the breeding stations, &c. Courses are also arranged at some of the model poultry farms.

Prizes of £2 10s. to £10 are given for the best managed flocks of utility poultry, frequently on condition that the money is used to improve the accommodation or the stock of fowls. The poultry houses must be well kept and arranged, the method of feeding and management satisfactory, and books kept showing total production, income, and receipts.

On somewhat similar conditions, prizes are given for the best "breeding centres." The exhibition of utility poultry at the shows is also encouraged. Incubators and rearers are distributed in some cases free to associations or societies on

condition that they are used for four months in the year and a report supplied on the results.

Plans of poultry houses, rearers, &c., and also account books, egg records, &c., are published by many of the Chambers. The formation of utility poultry clubs and shows is encouraged.

An interesting type of association has been introduced in Saxony and Baden for the co-operative sale of fowls and eggs, together with the supply of pure-bred fowls to members. The essential feature, however, of these societies is that the members strictly confine themselves to one breed of fowl, in the belief that by the uniformity thus obtained greater facilities for sale will be obtained, as well as a general improvement in other ways. Uniform rules for breeding, feeding, and management are laid down, and the co-operative purchase of feeding stuffs, implements, &c., is undertaken.

In this connection it may be noted that the introduction of societies of this kind is regarded as the best means of promoting the fattening industry, which at present is not very greatly developed. As is well known, success in poultry fattening on a large scale can only be attained by a division of work, and in many districts the foundation for successful fattening does not exist, that is to say, a suitable breed is not kept in the adjoining districts in sufficient numbers to provide a fattening establishment at all times with a regular supply of young fowls. The establishment of societies such as those mentioned above is suggested as the best means of organising a fattening industry in any locality.

Co-operative Egg Societies.—The poultry industry in Germany has undoubtedly been very greatly stimulated by the successful formation of co-operative associations for the sale of eggs. There were, in 1907, 314 of these associations, besides a number of societies not exclusively egg societies. The sales in 1906 by these 314 associations amounted to 41,219,000, the two main districts being Hanover, where the sales amounted to 22,100,000, and Oldenburg, which accounted for 12,657,000.

The first Egg Association in Hanover was formed in 1895, and in 1907 there were 138 such associations. The main points insisted on are : (1) Each member is bound to supply

to the association all the eggs produced on his holding, except those required for his own use or for hatching. (2) Only eggs thus produced may be supplied. (3) The eggs must not be more than 3-4 days old in summer, and 6-8 days in winter. (4) Eggs which have been under a hen even for one day may not be supplied. (5) Eggs to be taken daily from the nests and stored in a cool, airy place. (6) All eggs must be stamped with the mark of the association and number of the member. (7) Each egg is tested at the collecting station, and fines imposed for inferior eggs.

The payment is usually by weight, but sometimes by number. Payment by weight is said to have caused members to keep better fowls, and generally the introduction of co-operative sale has led to a great extension in the number kept, three times as many fowls now existing in some districts as compared with earlier years.

Milk Chickens.—Some interesting information is given in the report above referred to in connection with the production of milk chickens, which is a local industry of some importance in certain parts of Germany, especially in districts within easy reach of some of the large towns.

The Board are informed that fat chickens of this type are imported from Hamburg to London, where they fetch high prices at certain seasons of the year, and it is stated these birds have, at any rate to some extent, supplanted the importation of *poulets de lait* from France.

The industry appears to exist at isolated places in East and West Prussia, Schleswig-Holstein, Hanover, Oldenburg, and at Wangenau, near Strasburg.

In the district of Winsen, Hanover, eight poultry breeding stations have been established by the district authorities in conjunction with the Agricultural Chamber, for the purpose of supplying the district with the breeds of fowls especially adapted for the production of early chickens. The breeds selected in this district are the Ramelsloher, Wyandotte, and Orpington, and these breeds are also crossed among themselves and with the native breed. The establishment of the stations has helped to prevent in-breeding, and the introduction of fresh blood has made the fat chickens more capable of endurance and early ripening. It is asserted that the

chickens can be sold about four or five days earlier than formerly at the same price.

The fat chicken industry in Winsen is almost entirely in the hands of quite small holders. The annual production is from 300,000 to 400,000 chickens, which go almost exclusively to Hamburg. It is not unusual for one small fattener to supply from 200-400 chickens in the winter months at a price of 9½d.-11d. each. In Ramelsloh and some other places in the district there are establishments attached to small holdings which supply 700-800 chickens. No difficulty is experienced in disposing of them, dealers collecting them from the fattener.

A somewhat analogous industry exists at Diepholz, in Hanover, where young goslings are hatched for fattening in winter. The Diepholz goose possesses the peculiarity of laying eggs in winter, which property has been greatly improved by selection. The laying period begins in September and October, and continues with intervals to January, and with some birds even to February and March. The goslings are kept by the breeders till about six weeks old, when they are bought by fatteners. The price obtained is 5s.-6s. in the early months, and 3s.-3s. 6d. in February-March. The fat goslings are nearly exclusively supplied to Frankfort. The milk chicken industry also exists in the neighbourhood of the Dummer See, near Lubeck. Here the Ramelsloher breed is kept, and this breed is also crossed with Faverolles. The chickens are sold at Bremen.

Another centre exists in the district of Delmenhorst, in the Duchy of Oldenburg, where it has been carried on successfully for many years by small holders, cottagers, factory hands, &c. About 2,000 geese, 2,000 ducks, 30,000-40,000 chickens are sent away yearly to Bremen and Berlin.

Production begins in September-October and ends in April-May, the principal hatching time being from November to March. The newly-hatched chickens, as soon as they are dry, are taken away from the hen and placed in a basket near an oven. For the first day they receive only milk and dry groats; on the second or third day they are placed in fattening coops, and then receive barley meal mixed with curdled milk, and occasionally also some dry groats or buck-

wheat. From the second week onwards the barley meal is mixed with cooked, minced river fish (not gutted or scaled), on which the birds thrive excellently. At the age of 5-6 weeks they reach a weight of 1-1½ lb. and are ready for killing, when they are taken away alive by dealers. It is noted that the efforts to introduce this industry into other parts of the Duchy have not met with much success.

A COMMON WEED—THE POPPY.

Several very similar species of plants belonging to the genus *Papaver*, of the botanical order *Papaveraceæ*, and generally included in the term Red or Scarlet Poppy, are among the most common weeds of cornfields in many parts of the country. Thus in parts of Sussex, the cornfields may be seen from afar to be carrying large crops of "Red Weed," as it is termed; in parts of Lincolnshire also poppies are a great scourge, while so prolific are they in Norfolk that the district around Cromer has received the name of "Poppyland." In passing through a corn-growing district where poppies abound nothing is more striking and picturesque during the months from June to August than the scarlet-covered acres, but all who are acquainted with the harm done by an excess of weeds will appreciate the loss which a poppy-infested corn crop must suffer. The seeds, however, are so numerous and so easily spread that it is almost impossible to keep one farm in a poppy district clean if other farms are neglected.

Description.—There are four species of *Papaver* which may be said to be established in Great Britain:—*P. Rhæas*, L., *P. dubium*, L., *P. Argemone*, L., and *P. hybridum*, L., while *P. somniferum*, L., the Opium Poppy, is an occasional escape from cultivation. Of the foregoing species, *P. Rhæas* and *P. dubium* are the most widespread, and are those most commonly occurring in cornfields, and will therefore alone be dealt with here.

Both of these species are erect annual weeds, attaining one to two or more feet in height. They have deep tap roots and branched hairy stems and flower-stalks, the hairs in *P. Rhæas* spreading outward from the flower-stalk, but in *P. dubium* pressed close to it. The leaves are pinnatifid or "feathered,"

bearing segments arranged on each side of a common midrib. The stems exude a milky juice when bruised or cut. The flowers are some three inches or more in diameter and scarlet in colour. In *P. Rhæas* (Common Red Poppy), the seed capsule is not much longer than it is broad, while in *P. dubium* (Long Smooth-headed Poppy) it is more than twice as long as it is broad. In each case the capsule is smooth. The seeds are produced in large numbers (10,000 to 50,000 by one plant), and being very small they may, on escaping from the capsule, be blown considerable distances by the wind. They are, moreover, of an oily character, and may retain their vitality when buried in the soil for some years, germinating and producing mature plants when brought to the surface under favourable conditions. It is stated in *English Botany* in regard to *P. Rhæas* that "the seeds remain underground, retaining their vegetative powers for a long time, and furnishing a fresh crop of poppies whenever the earth is turned over." It is therefore clear that the eradication of the poppy is a difficult matter.

Poppies pass under a variety of names, and Dr. A. B. Smith enumerates the following common names for *P. Rhæas* :—Corn poppy, Corn flower, Corn Rose, Canker rose, Cock rose, Cop rose, Copper rose, Blind eyes, Headache, Red weed.

Distribution.—The species of *Papaver* are now of almost world-wide distribution, and one or other of the five species mentioned above occurs in Europe, Asia, and North Africa, while two or three of these species have been introduced into America. *P. Rhæas* occurs throughout the southern and midland counties of England, in Ireland and the Channel Islands, but, according to Hooker, is rare north of the Tay. *P. dubium*, on the other hand, is, according to the same authority, found in Britain north to the Shetland Islands, and also in Ireland and the Channel Islands.

Both these species are common weeds of cornfields and waste places. Although they are most commonly found on light, dry, sandy and gravelly soils, they nevertheless flourish even on heavy wheat land, though not to the same extent as on the lighter soils, such as barley land.

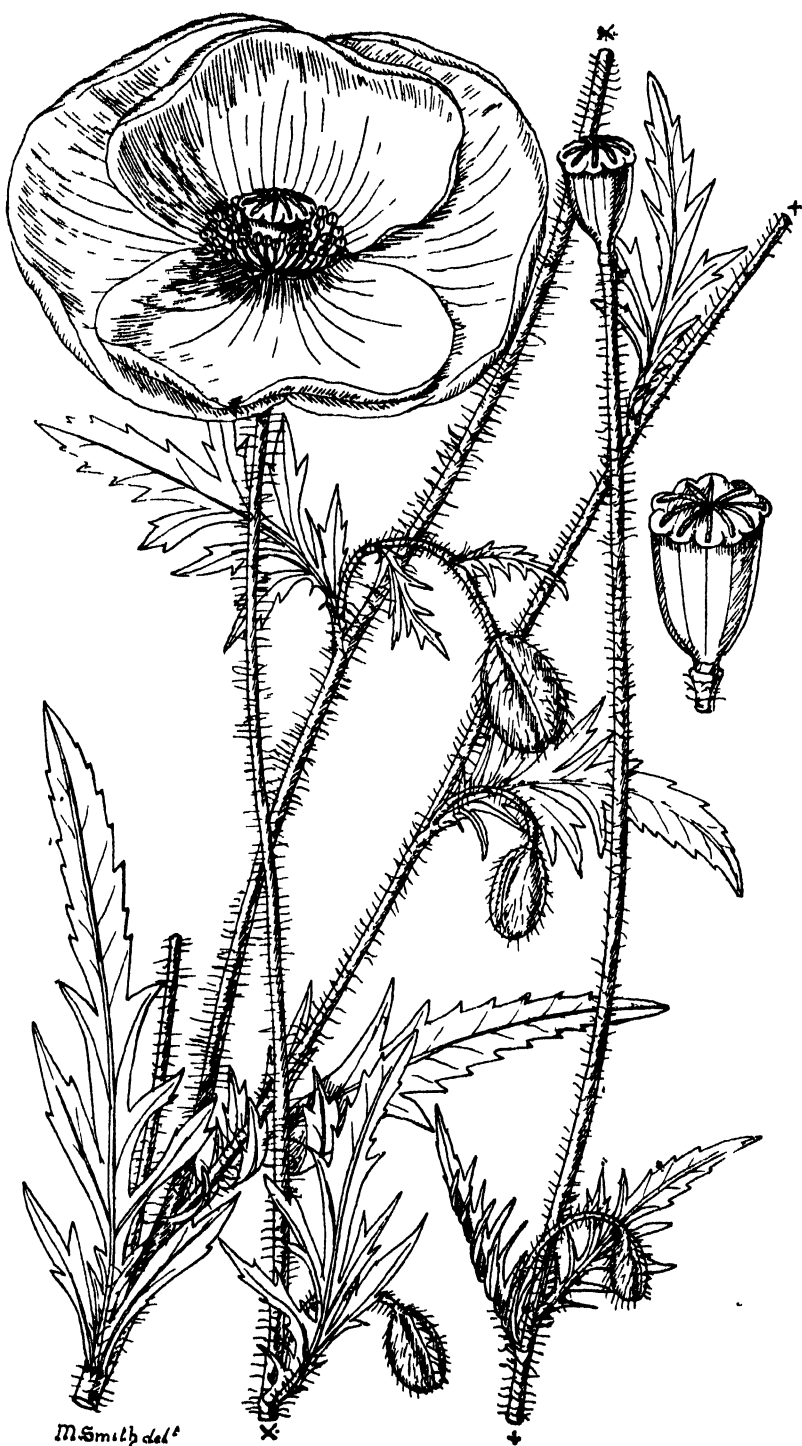
Life History.—While poppies have in some cases been

present on farms for generations, they may be introduced to otherwise clean farms by means of unclean seed. The seed germinates most freely on a soil in good tilth in the spring, during damp, warm weather, while the established plants grow most rapidly and strongly during hot summer weather. Unless protective measures be adopted, flowers will quickly mature, seed capsules will be formed, and the thousands of seeds will speedily be distributed by the wind. Although subsequent deep ploughing may bury them, future cultivation will bring them to the surface, and the crops will again be infested, with a tendency to serious reduction in the yield.

Narcotic Properties, &c.—Several of the poppies contain active toxic or narcotic principles, the worst species in this respect being the Opium Poppy (*Papaver somniferum*), and the drugs opium, morphine, and laudanum are prepared from poppies. Cornevin states that *P. Rhæas* is poisonous in all its parts, and sufficiently so to occasion accidents every year. The poisonous property is due to the alkaloids morphine and rhœadine. Domestic animals may be poisoned when fed with clovers or sainfoin which are infested with the poppy, or even when they take the capsules with other waste matter from winnowing or grading cereals.

Professor Henslow says that cattle have been "occasionally injured by eating unripe poppy-heads when the plant was mixed with clover and sainfoin." In general, however, stock are safe where poppies abound, because the disagreeable taste and smell of the flowers and plants render them obnoxious to the stock.

According to Cornevin, cattle poisoned by *P. Rhæas* exhibit at first symptoms of excitement, shown by continual movement, by pawing the soil or litter, by increased respiration and a more rapid pulse. This is followed by stoppage of the digestive functions, and sometimes a little swelling of the eyelids. These preliminary symptoms are succeeded by a period of coma, the animal appears to sleep while standing, remaining motionless, and if forced to move walking in an unsteady manner. Soon it falls, and, if the end is to be death (which is exceptional), remains stretched out on the ground; respiration becomes slower, the temperature falls, and after



THE POPPY (*Papaver Rhæas*, L.).

a few convulsive movements, death supervenes owing to arrested respiration.

The red colouring matter in the petals of poppies is utilised for certain purposes in the arts.

Prevention and Remedy.—It should be remarked at the outset that great care should be taken to employ only clean seed corn for seed purposes.

There are several methods by which poppies may be combated, and perhaps the most obvious is to prevent the seeding of any plants which may be observed.

Where seeding is known to have occurred, however, the procedure should be to encourage early germination in spring by endeavouring to keep the seeds at the surface and procure a fine tilth. In damp weather the seeds will commence growth, and as soon as fine, dry weather occurs, surface cultivation with the hoe, light harrows, the poppy killer (see *Journal*, July, 1904, p. 196), and the various types of American weeder, will tend to destroy the young plants. A repetition of this procedure will account for a considerable proportion of the growing poppies, and after the corn crop is too high hand weeding may need to be resorted to.

Where the poppies occur in overwhelming numbers it may be advisable to forego a corn crop and take an extra root crop in the rotation, and by this means the poppies may be largely reduced.

In experiments conducted at the Woburn Experimental Farm in 1900 and 1901, poppy plants (*P. Rhæas*) were injured by spraying with a 2 per cent. solution of copper sulphate just before they came into flower, but afterwards recovered. When the solution was applied to the underside of the leaves as well as to the upper surface, "the leaves turned brown, became shrivelled, and to a great extent the plant was killed, for the seeding was almost entirely prevented, the flower heads withering up." Now in a tall corn crop with poppies nearly at the flowering stage, spraying could only be done by hand, and the wetting of the underside of the leaves could scarcely be accomplished. But since it is well known that in charlock spraying a 3 per cent. solution of copper sulphate does little if any damage to the corn crop, a 3 per cent. solution might be tested on poppies when they are no more than

half or one-quarter grown, at a time when the corn crop is not too tall to prevent the solution duly wetting the poppy plants. Further, although a single application of a 2 per cent. solution has not proved successful, two applications of a 3 per cent. solution with an interval of a few days might have the desired effect.

Maier states that the common scarlet poppy is very sensitive to a 13 to 20 per cent. solution of sulphate of iron, and as a 15 per cent. solution has been found to do no permanent harm to the cereal crop when destroying charlock by this method, a solution of this strength might be tried.

To make a 2 per cent. solution of copper sulphate, 8 lb. should be dissolved in 40 gallons of water; for a 4 per cent. solution, 16 lb. in 40 gallons of water. To prepare a 15 per cent. solution of sulphate of iron, 60 lb. must be dissolved in 40 gallons of water. In either case 40 gallons of solution will suffice for an acre of the cereal crop. To dissolve the sulphates of copper or iron the powdered material should be placed in a bag and suspended in the water by tying the top of the bag to a rod placed across the mouth of the barrel or tub containing the water. Warm water and frequent movement of the bag will aid solution.

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The *Kew Bulletin* (No. 1, 1909) contains an account of a disease caused by a parasitic fungus named *Spondylocadium atrovirens*, Harz.

Dry Scab of Potatoes.

This has been known on the Continent since 1871, and under the name of *Phellomyces sclerotiphorus*, Frank, is stated by Professor Johnson to be the cause of serious trouble to the potato crop in Ireland. It also occurs in the United States.

Recently three samples of diseased potatoes were sub-

mitted to Kew for examination. Two of these came from different parts of Scotland, the other from England. The disease in each instance proved to be "Dry Scab," which up to then had been believed to be absent from Britain.

The injury is confined to the tubers, and no indication of its presence is suggested by the foliage, which remains unaffected. It causes disfigurement of the surface of the tuber, followed by local patches of a dry rot. Its presence is revealed by the occurrence of blackish-olive or blackish-violet patches, which soon become depressed below the general surface of the tuber, due to the drying and breaking up of the tissue. Very frequently only one or two such sunken areas, which vary from half an inch to an inch across, are present on a tuber. As a rule, numerous very minute black sclerotia are present in the epidermal cells, or on the surface of the tuber, in the region of the sunken areas. In some instances numerous minute sclerotia, scattered over the surface of the tuber, are alone present. During a certain period in the development of the disease, the depressed patches and the sclerotia are covered with the fruit of the fungus, which under a pocket-lens resembles myriads of very minute, upright black bristles. As the dark coloured mycelium permeates the tuber, the tissue becomes dry and somewhat powdery, and crumbles away, leaving a shallow cavity. Those portions of the skin bearing sclerotia also readily peel off in flakes, which remain in the soil and endanger future crops. If a tuber bearing sclerotia or sunken areas is placed in a damp, warm place, the fruit of the fungus is produced in abundance within a few days. Such fruit is not confined to the obviously diseased portions, but occurs scattered over the entire surface of the tuber, proving that mycelium migrates from the primary diseased areas, and that portions of the tuber apparently free from disease are in reality infected; consequently, it is not advisable to use as "sets" any tubers showing signs of the disease, as is too frequently done, after the obviously diseased portion has been cut away.

An illustration of an affected tuber and of the fungus, together with some other particulars, is given in the *Bulletin*.
"

Sprain in Potatoes.—Several complaints have reached the Board respecting the losses caused to potato growers from the ailment known as sprain in potatoes, and it is asserted that cases of it are becoming more frequent and are causing some anxiety in Scotland and elsewhere. Considerable uncertainty prevails respecting this ailment, and not only is the cause unknown, but even the symptoms are not always agreed upon. The following points, however, appear to be settled. When the potato is cut through the middle, brown spots are found, which one correspondent has described as like the currants in a currant loaf or scone. When the potato has been cooked, the spots do not blacken, but can be picked out almost like pellets. The cropping of the potatoes is not affected, and the ailment is found in well-proportioned tubers. Nor is there any appearance in the haulm to indicate the presence of "Sprain," though according to another correspondent the haulm of the potato is darkened and covered with a white scale when the tubers are beginning to be attacked. The ailment develops in the pit, and in one case where part of a crop was sold off the field, and part was put into pits, the former was slightly and the latter seriously affected. It starts at the "heel end" of the potato.

The varieties likely to be able to resist "Sprain" are a subject of inquiry, but the Board are informed that practically every variety is liable, though British Queen is particularly susceptible. The ailment is usually found on a gravelly, but sometimes on a sandy soil, and it is said to be unknown on a stiff soil. It has been suggested that it is due to a deficiency of potash or lime in the soil, but at least one case has been quoted to the Board in which a field has been affected where these ingredients were not lacking. The weather has a material effect on the progress of the ailment, for it grows much worse in dry, hot seasons, while in damp years it is very little known. Finally, there is no evidence that it is conveyed by the seed, and sprained potatoes have been planted over and over again without any bad results. Further information is clearly desirable, and the Board would welcome any other communications which would add to their knowledge

of the symptoms and development of the complaint. Up to the present no cause can be assigned for "Sprain," but it appears to be of a physiological nature, and, if so, the name "Sprain," which suggests a mechanical cause, is not a very suitable one.

One curious case in connection with "Sprain" was reported to the Board. A correspondent from Chester forwarded a potato which he believed was suffering from this complaint. Upon investigation this proved to be a case of arrested Winter Rot (Leaflet 193). For some unknown reason the disease was stopped in its development, and instead of running its entire course and causing a complete wet rot, it simply produced slight rifts in the flesh of the tuber, accompanied by the discoloration of the tissue in places.

Collar Fungus.—A disease respecting which the Board have received many complaints is that known as Collar Fungus. Strictly speaking, this is an incorrect and unscientific name, and merely implies that the collar of the plant is affected. Hence a certain amount of confusion appears to have arisen. Occasionally the words are used for the parasite *Armillaria mellea*, Wahl., otherwise called Tree Root Rot (Leaflet 174). This is one of the most abundant and widely distributed of British toadstools, and grows in dense clusters round the roots of living trees and dead stumps. But there is another disease known as Gooseberry Collar Fungus, which is due to *Cytosporina ribis*, P. Magnus. This latter parasite has also been recorded as causing the disease in Holland (Van Hall in *Annales Mycologici*, Bd. 1, 1903, p. 503). Bushes attacked by this disease often die somewhat suddenly and for no apparent reason. A careful examination of the bush shows that the bark of the stem just above the ground line is browned and dead. The fungus fruit in such cases may be seen in the form of small black bodies embedded in the bark, but in some cases the larger branches of the root are also attacked. In other cases, however, the disease seems to affect one branch to begin with and to spread gradually until in one or two seasons the tree is killed. It does not spread continuously through a garden, but appears irregularly among the bushes, in a manner that suggests a wound fungus. Perhaps for this reason fruit

growers are not as fully alive to the losses they incur as they might otherwise be. With the object of ascertaining whether the nature of the soil affected the spread of this disease in any way, the Board made a few inquiries in districts where the fungus was said to be prevalent. The results were not reassuring. Gardens in Huntingdonshire on light loams, as well as others on gravel, were seriously affected, while gardens in Cambridgeshire situated in stiff white clay were equally diseased. In Herefordshire the disease is found on heavy soils, mostly of Lias clay origin, and in Kent it is found on all kinds of ground. It has been suggested that it is due to imperfect drainage, but as far as has been ascertained up to the present, the bushes on well-drained land are as liable to attack as on other kinds of soil. One report states that a certain grower in Kent—an educated man—declared that in a certain spot in his garden bushes were always attacked. Young, strong bushes were planted when the dead were removed, but even these were killed in due course. All round this spot, however, which is some four to five yards square, the bushes were healthy and strong. The drainage, shade, &c., were uniform throughout the garden. This evidence is not, however, borne out by other growers, who have planted with success healthy bushes on the same site as bushes killed by the fungus. Reports from Huntingdonshire say that only “one-legged” bushes are attacked, but this is not confirmed in Kent. Further investigation is required and specimens of bushes so affected should be sent to the Board for examination, together with a full report of the conditions under which they have been grown. Some cause may thus be discovered to explain why a fungus, which, judging from its affinities, is not a rampant parasite, though ready doubtless to attack an already enfeebled host, should be so widespread in England and the source of so much injury.

Ghost Moth.—A specimen of carrot badly attacked by the larva of the Ghost moth (*Hepialus humuli*) was forwarded to the Board from Southend-on-Sea. The correspondent reported that the caterpillars had proved very destructive to his crop, and that he had frequently turned them up with the spade whilst digging a new plot for

cultivation. Readers of Curtis's "Farm Insects" will remember that he records a case which came under his own observation of a similar attack on a carrot (pp. 407-8).

Red Spider.—A report from Wisbech states that Red Spider made its appearance on gooseberries on the 21st March. The growers were all at work spraying the next day.

The Board have received a report, through the Foreign Office, from the British Vice-Consul at Nuremberg (Mr. S. Ehrenbacher) furnishing particulars

**Hop-growing
Industry in
Bavaria.**

of a circular, issued in February last by the Bavarian Home Secretary, in which it is stated that as a consequence of low prices the hop industry in Bavaria has during the last few years passed through an extremely unfavourable period. Quotations in 1908 touched a point which, on the whole, does not cover the cost of production, and large quantities of hops have remained unsold even in districts well known for the quality of their produce. Hop-growing in the United States and in Russia has greatly extended, and owing to the large world's crop of the last four years stocks have increased in unusual quantities, while at the same time the production of beer is not keeping pace with the increase of population. In these circumstances an improvement is hardly to be expected at present.

The acreage in Bavaria has in consequence decreased perceptibly. In 1905 it was 62,731 acres, and in 1908 56,716 acres, a decrease of 6,015 acres, or 9.5 per cent. In the same period the acreage for the whole German Empire decreased by 0.2 per cent. The crops, however, have been large, amounting to 302,000 cwt. in 1905 and 279,000 cwt. in 1908, compared with an average during the last ten years of 236,000 cwt. As the Bavarian brewery trade consumes only about 128,000 cwt., the figures show that the Bavarian hop industry depends upon its exports. By economy, careful choice of varieties, and suitable treatment of the hop, more favourable results may be obtained; but, in general, Bavarian farmers are advised, especially on land not

thoroughly suitable for hops, to substitute some more reliable crops for hop-growing, which involves a considerable outlay of money and labour. Special emphasis is laid on the recommendation that under no circumstances should new hop-gardens be laid out. The district authorities and agricultural teachers are instructed to influence farmers in this direction.

A meeting of the Committee appointed to consider the state of the industry was held in March under the presidency of the Bavarian Home Secretary, and representatives of the growers, merchants, and brewers were present. According to a further dispatch from Mr. Ehrenbacher, no very definite result was attained, but the view was generally expressed that the position of the Bavarian hop-grower could be improved by confining hop-growing strictly to suitable districts and soils, by grubbing hops on poor soil, by the selection of plants, and by careful picking, drying, sorting, and packing. The enactment of regulations providing for certificates of origin was not considered necessary.

The Government will encourage the establishment of experimental grounds and of exhibitions, and will consider the question of assisting the industry either by a protective tariff or other ways.

The development of agriculture in Brazil is being actively encouraged at the present time by the Central and Provincial Governments, and seems to offer,

**Opening for Export
of Live Stock and
Machinery to Brazil.**

both as regards live stock and machinery, an opening for the export of British produce. The demand for breeding stock has been dealt with in previous numbers of this *Journal* (August, 1907, p. 303; March, 1908, p. 738; April, 1908, p. 50, and January, 1909, p. 755), and the Board have now received, through the Foreign Office, a despatch from the Acting Consul-General at Rio de Janeiro (Mr. V. H. C. Bosanquet), giving some particulars as to the model farms which have been established in the province of Minas Geraes for instruction in practical agriculture and stock-raising. This gives an indi-

cation of the way in which agriculture is being fostered, and also incidentally furnishes some particulars as to the demand for machinery and live stock.

Model Farms.—The model farms in question were created as the result of a State law passed on September 24th, 1906, and the regulations issued in conformity with it provide for six such farms, financed by the State Government, to be opened in different parts of the State, in addition to any similar farms which might be established by joint municipal and State aid. These farms were to be of four types:—(1) A farm about 120 acres in extent, to afford instruction in agriculture with the help of implements, but without machinery for finishing products, such as coffee or rice; (2) a farm of about 300 acres to afford instruction in the cultivation of two or more crops, with the view of showing the most economical method of cultivating and improving a small area; (3) a farm of about 480 acres to be provided with hydraulic and other machinery for general agricultural purposes, with the view of showing the most practical and economical method of cultivating the ordinary farms in the State; and (4) a farm of 960 acres provided with machinery of the most advanced type, in order to afford instruction in agriculture on a large scale.

In each type of farm it is proposed to maintain (1) stud-bulls and other selected pedigree animals to be lent without charge for breeding purposes; and (2) a stock of agricultural machines to be sold to farmers at cost price.

Four of these farms are now in existence, and two others appear to be in contemplation. Various crops not commonly grown in Brazil, or to which insufficient attention is given by the ordinary farmers, are being cultivated, such as wheat, barley, rye, and roots for cattle, and these have given promising results up to now. Native crops are also grown, and experiments and demonstrations carried out to show the value of artificial manures.

Machinery.—The agricultural implements in use come largely from the United States, and include stump pullers, reversible disc ploughs, common wooden beam ploughs, drills, grass-cutters, cultivators, and harrows. Chain and disc harrows and picks are also imported from England. The

reversible disc plough is in very great demand, not only on the model farms, but all over the State. Every farm of any consequence possesses one or more of these ploughs, and in some cases a considerable number. The fixed disc plough is not found suitable except in the larger sizes, such as those having three, four, or six discs. During 1907, 799 agricultural machines and implements were acquired by farmers from the stock held in connection with the farms. The machines and implements are usually purchased through agents at Rio de Janeiro or Sao Paulo, whose names can be ascertained on application at the offices of the Board, 4 Whitehall Place, S.W.

Live Stock.—The favourite cattle in the State of Minas for breeding purposes have been the Indian zebu, on account of their robustness, easy acclimatisation, and size and strength for draught purposes, but a strong reaction has now set in in favour of milking strains, chiefly Dutch, Swiss, and other Continental breeds, though a demand is growing for some English breeds, such as Guernsey, Jersey, Lincoln Red Shorthorn, Devon, and Hereford. These European breeds are now being introduced by the Government and by the model farms, as well as by a few of the more advanced farmers of foreign extraction. The Swiss and Dutch cattle and the Devons are said to have become acclimatised well.

Sheep have so far received little or no attention. Goats of the Nubian and Alpine varieties are in demand.

Horses are being more looked after in the State farms, the favourite breeds for crossing with the existing animals being Arabs and English thoroughbreds. It is suggested that experiments should be tried with the Shire, Suffolk, Hunter, and Hackney breeds, and specimens of the three latter breeds have been ordered by the State Government.

As regards pigs, the most successful crosses have been obtained by introducing the Large Black, Large White, Berkshire, and Poland China breeds. The production of bacon and ham is not aimed at, but merely the heaviest possible weight in the shortest time.

There is a very well equipped Agricultural College at Lavias, which receives a grant from the State on condition

that a number of farmers' sons are educated free. This College has recently purchased animals from the United States, including Hereford and Jersey cattle, and Berkshire and Poland China pigs.

Exhibition of Machinery at Para.—In connection with the above, reference may be made to a permanent exhibition of agricultural machinery which is being organised in the city of Para, Brazil, by the Sindicato Industrial e Agrícola Paraense. The object of this exhibition is to familiarise local agriculturists with machinery and implements, and to supply information as to prices, makers, methods of use, &c. All expenses of delivery must be borne by the owners, and the machinery must be presented to the Syndicate, but the Syndicate will undertake the expenses of the exhibition and also of making the articles known at the principal agricultural centres. The address of the Syndicate is Rua 13 de Maio, No. 13, Para, Brazil. Printed information on the subject can be seen at the Commercial Intelligence Branch of the Board of Trade, 73 Basinghall Street, E.C.

In a despatch to the Foreign Office, the British Minister at Bogota (Mr. Francis Stronge) gives some further information as to the demand for live stock in Colombia, South America, in continuation of the information given in this *Journal*, July, 1908, p. 289.

**Demand for Live
Stock in Colombia,
South America.**

It appears that thoroughbred horses and pedigree cattle are frequently purchased from England, though it is doubtful whether thoroughbreds are likely to be of much use in Colombia; a fancy for them, however, exists among a small class. Ploughing and other farm work is universally performed by oxen, which are extremely slow. It seems possible, therefore, that if the cost of labour were to increase, it might be profitable to import farm horses, a class of animal which does not now exist in the country. A very fine Shorthorn bull was recently imported, and it is not unlikely that a steady, though very limited demand for high-class animals of this breed may be developed. Devons are becoming popular, and the breed is believed to be less liable to degenerate than the Shorthorn. Very few Polled Angus have been imported, but the breed is much admired.

Oxen are much used as beasts of burden, and it has been suggested that some Indian breeds might be serviceable for this purpose.

Sheep do well on the hills about thirty miles to the north of Bogota. This is the region of the salt mines, and the mutton is almost equal to the *pré-salé* mutton produced on the marshes of Normandy. It is probable, however, that the breed could be improved. Pigs have been introduced from Europe by a German resident, and this is a matter which deserves more attention than has yet been given to it.

The cattle business requires a large capital, but when properly managed it is extremely profitable, especially perhaps in the Tolima. The breeding is generally in the hands of cottiers with only a few acres of land. These sell their young stock to the smaller landowners, who, in turn, pass them on to the large proprietors to fatten for the market. The cattle were generally driven off in the Tolima during the Civil War, and there was simultaneously a great diminution in the population. Since the re-establishment of order, however, there has been a marked recovery.

The American Consul at Cartagena states (*U.S. Cons. Reports*, No. 3,376) that inquiries have recently been made in Colombia with a view to the export of cattle to the United States and England. It appears that the shipment of cattle from this Republic has hitherto been confined to Cuba and Panama, but the prevailing tariffs will lead Colombian cattle-growers to welcome a new market. There are at least 30,000 head of cattle in the Cartagena district available for immediate export, and at least 100,000 could be supplied within a year.

A further report from the same source (No. 3,402) states that at the present time cattle-raising forms the principal industry in the Sinu Valley in north-western Colombia, and the number of cattle is estimated at from one-half to three-quarters of a million. It has not been unusual for 100,000 beef cattle to be exported annually, and in some years this number has been exceeded. Little effort has been made to develop a dairying industry, although the country is naturally suitable. It is mentioned that there is probably an opening for dairy and agricultural machinery, as well as for cattle foods and remedies.

The object of the statutes known as the Truck Acts is to ensure the payment of wages entirely and exclusively in current coin of the realm and not by means of goods or other substitutes for money, although a provision in the Truck Act of 1887 allows a cottage to be given as part wages in the agricultural industry, and another section of the same Act allows food and non-intoxicating drink to be given to agricultural labourers.

**Supply of Cider to
Agricultural
Labourers.**

The operation of these Acts has recently been under the consideration of a Departmental Committee, and in their Report [Cd. 4442, price 1s. 3d.] they deal at some length with the supply of cider to agricultural labourers, a point on which they received evidence from Worcestershire, from representatives both of farmers and of the Local Authorities.

The representatives of the Worcestershire Farmers' Association and the Worcestershire Chamber of Agriculture informed the Committee that prior to the passing of the Truck Act of 1887 it was usual for farmers in making a contract to agree to give so much wages and so many quarts of cider a day. After the passing of the Act, which allowed only non-intoxicating drink to be given as part of wages to agricultural labourers, attention was called to the illegality of the practice of contracting to give intoxicating liquor as part of wages. The result was that the farmers stopped the practice of contracting to give cider as part of wages, and wages increased by about 2s. a week. Cider is now only given occasionally to labourers, more especially at harvest time when long hours are being worked, but it is a free gift and not part of wages, and the cider which is made on the farm has little or no commercial value; 3d. per week being the average cost. It was admitted that some farmers do not conform to the custom; and that if labour were not plentiful, those who did not give cider would be prejudiced. Cider no doubt was an attraction to labourers; they often preferred it to money, and men have refused to work overtime for money, and have demanded and got drink instead. The witnesses thought that more work was done when cider was given and that the practice did not encourage the habit of drinking, and had no deleterious effects on health, physique, or mental faculties.

If the practice were stopped, the evidence did not show that it would prejudicially affect the supply of labour, but it would not lead to any increase of wages, and it might even result in the men having less wages to take home, as they would probably buy the cider for themselves. There was also the risk that the abolition of the custom might lead to farmers evading the law by selling their men $4\frac{1}{2}$ gallon barrels of cider for a nominal sum, which would be an undesirable practice.

The Deputy Chief Constable of Worcestershire stated that the practice was very common in busy seasons, but it was not so prevalent as it used to be. He drew attention to the difficulty of getting information which would substantiate a prosecution, owing to the fact that in all cases the cider was given by private verbal arrangement between the parties: wages were the same whether cider was given or not, and the cider was undoubtedly an attraction to the labourer. He thought that, if the practice were stopped, the farmers would often have great difficulty in finding sufficient labour.

Mr. Willis Bund, Chairman of the Worcestershire Quarter Sessions and of the County Council, stated that there were two branches of this question, viz., the case of the ordinary farm labourers and the case of the seasonal labourers (*i.e.*, hop and fruit pickers). In both cases there is a well-known and recognised practice of giving cider. There is no expressed contract to this effect, but there is usually an implied bargain; and prosecutions had been successfully taken by the County Authorities in several cases, despite the defence that the cider was a free gift. That defence did succeed in one case, viz., that of *Long v. Crane*, and was upheld by the High Court, but in that case there was no doubt whatever that the cider was a free gift. The difficulty, however, was to get evidence as to the bargain between the farmer and his labourers. On the larger farms and with the better class of farmer the system of not giving cider and paying higher wages is spreading, and spreading to the great advantage of the people. It is only in out-of-the-way places and on the old farms and among the smaller men that the practice continues to the same extent. The case, however, is different with the seasonal labourer; he expects to have his cider or

other drink, and the farmers who had given up the practice find a difficulty in getting this class of labour. Mr. Bund instanced a case where 400 hop-pickers struck work because they were to get nothing to drink. He was dubious about this class of labourer taking to a system by which they would get no drink. A good many of them came out for a holiday and looked forward to this form of enjoyment. Mr. Bund said he objected to the practice *in toto* because it encouraged drinking habits, and in the case of seasonal labourers he thought it was also desirable in the interests of social order that the practice should be stopped.

The Committee observe, in reviewing this evidence, that the law cannot touch cases in which cider is *bona-fide* given by the farmer to his labourers as a free gift, but it would no doubt be desirable if the law could be strengthened so as to hit cases in which, by a secret understanding between the parties, cider is given as part of the remuneration of labour. The Committee state that they have considered whether any simple amendment of the law could be made which would effect this, but they regret that no satisfactory solution has been found. Mr. Willis Bund suggested to the Committee that wherever less than the current rate of wage is given the onus should be on the employer to prove that he did not give anything else to make up the wage, but the Committee think that there would be considerable difficulty in framing any statutory provision to this effect.

In conclusion, they observe that the custom appears to be gradually dying out, and the only remedy perhaps is the vigorous enforcement of the law by the police.

The Royal Commission on Coast Erosion and Afforestation having had before them the recommendation of the

**Area of Land
available for
Afforestation.**

Departmental Committee on Forestry that a survey should be made with the view of obtaining "an accurate estimate of the amount of waste lands which might be considered suitable for planting," suggested that the Board of Agriculture and Fisheries should "by means of qualified agents, specially appointed, cause inquiries to be made in certain selected

counties of England, Scotland, and Wales, and furnish a report to the Commission on the question." The Commission suggested that such of the area returned as "Mountain and heath land used for grazing" as lies below the 1,500 ft. contour line in the selected counties should be reported upon, and that the selected counties should be Wiltshire, Suffolk, Derbyshire, Glamorganshire, Lancashire, and Lanarkshire.

An inquiry on these lines was accordingly undertaken, and a copy of the Report of the Board of Agriculture and Fisheries on the information obtained, together with the reports furnished to the Board by their special inspectors, are printed as an Appendix to the evidence published by the Commission (Vol. II., Part II., Cd. 4461, price 5s. 3d.).

It appears that the total area (excluding water) of Great Britain according to the latest figures of the Ordnance Survey (revised August 31st, 1908) is 56,199,980 acres. Of this, the acreage under crops and grass—*i.e.*, what is usually termed the cultivated area—amounts to 32,211,386 acres. A further area of 2,768,243 acres (as returned in 1905) is woodland, and of the remainder 12,801,974 acres are returned as "mountain and heath land used for grazing." It will thus be seen that 8,418,377 acres remain unaccounted for in the Agricultural Returns. A very large proportion of this unreturned land is appropriated for urban requirements, while railways, roads, mines, quarries, and other industrial operations absorb in the aggregate a considerable portion of the surface of the country. The extent of land within the boundaries of boroughs and urban authorities in England and Wales, and of Royal, municipal, and police burghs in Scotland, amounts approximately to 4,000,000 acres. Some of this, though probably a small proportion, is included in the Agricultural Returns.

According to a computation made by the Board, about 3,537,172 acres of the total surface of Great Britain lie above the 1,500-foot level. Although such part of this elevated land as is used for grazing should properly be returned, it may be assumed that a large part would not be so used. Probably a considerable proportion of the area occupied by deer forests would come within this computed area.

It may be added that, according to a return of 1874 (H.C.

85 of 1874), the estimated extent of land subject to common rights in England and Wales was at that time 2,632,772 acres.

In attempting to estimate the extent of so-called "waste land" which might be available for planting, we may deduct in the first instance, the land already under woodland and also that which is under cultivation (*i.e.*, returned as under crops and grass). This leaves in round figures 21,000,000 acres. From this we may deduct the land above 1,500 feet and the land subject to common rights, say, together, 6,000,000 acres. The area of urban districts may also be deducted in a rough calculation of this kind, as, although it comprises a certain amount of land included under other headings, there is, on the other hand, a large aggregate amount of land appropriated by the smaller towns and villages which should properly come under this head. The amount of "waste" area is thus reduced to 11,000,000 acres, which total would include not only absolutely barren and rocky land, but also a large area occupied by railways, roads, quarries, mines, &c., outside urban areas. By this process of exhaustion it will be seen that the amount of "waste land" not under crops or woods, not above the 1,500-foot level, not subject to common rights, and not included in urban areas, comes to a total appreciably less than the area returned as "mountain and heath land used for grazing." The inference is that a certain proportion of this land (none of which is included in the land under crops or woods) is above the 1,500-foot level, or subject to common rights or included in urban areas.

The manner in which, at the suggestion of the Royal Commission, the problem was approached in the inquiry was to take the area returned as mountain and heath land used for grazing as representing the extent of available surface which might be utilised for afforestation, and to estimate what proportion of this area in the six selected counties might be regarded as actually suitable for planting.

The gentlemen who were selected to report on these counties were requested to say how much of the land returned as "mountain and heath" might be regarded as suitable for afforestation, whether it would be more profitably

utilised than at present if it were planted, and, in general terms, what class of timber would be most suitable for it. They were also invited to add any general observations as to the present average rental value of the land, and remarks on the probable effect of a wide extension of woodland in the district.

The proportion of the mountain and heath land used for grazing which was reported as suitable for planting ranged from *nil* in Wiltshire to 44 per cent. in Lanark, and 71 per cent. in Suffolk. Taking the six counties as a whole it appears that of the 508,664 acres of the land returned as mountain and heath in 1907, about 33 per cent. may be regarded as suitable for afforestation.

There is no statistical justification for assuming that the "sample" taken by means of this inquiry is representative of the bulk, or, in other words, that the proportion of suitable land found in the six counties can be properly applied to all the remaining counties. Sufficient information has been obtained, however, to indicate that very large deductions must be made from the total area returned as mountain and heath to arrive at a figure which would represent land suitable for planting. The reports seem to suggest that a large part of the land over 1,500 feet is included in the area returned. If it is assumed that out of the 3,537,000 acres above 1,500 feet two millions were included in the returns of mountain and heath land, that area from the afforestation point of view would be reduced to less than 11 million acres.

The suitability of land other than that included in the returns of mountain and heath land used for grazing was not, strictly speaking, included in the inquiry, although it is referred to incidentally in the reports, and is sometimes confused with it. Apart from rough or waste land, which, not being used for grazing, is not returned under this heading, the suggestion is made that there is a certain proportion of the 32½ million acres returned as cultivated land which is of very low value for farming purposes, and might be taken into account in a general survey of land suitable for afforestation.

During the past month, the Board of Agriculture and Fisheries have published Parts I. and II. of the Agricultural

**Reports on the
Agricultural Statistics
for 1908.***

Statistics for 1908. Part I. [Cd. 4,533, price 6d.] contains the complete and final returns of the acreage under crops and number of live stock, while Part II. [Cd. 4562, price 4½d.] gives the corresponding returns of the produce of crops. Each part is prefaced by a report by Mr. R. H. Rew dealing with various points of interest arising in connection with the Returns.

Census of Production.—The amount of information which occupiers of land were asked to supply in the annual schedule was increased by the addition of certain questions relating to the agricultural side of the Census of Production, but farmers have met these increased demands in a very public-spirited and enlightened way, and it has been found that out of about 517,000 schedules nearly four-fifths contained more or less detailed answers to the supplementary inquiries. Information on various points is also being obtained by means of special schedules, in regard to which the Board hope to secure the further co-operation of those specially concerned.

In regard to these special inquiries, Mr. Rew observes that it is perhaps not always appreciated that British agriculture in these days is not so much a single industry as a congeries of industries. Corn-growing, stock-breeding, stock-feeding, milk-selling, butter-making, cheese-making, although to a large extent interdependent and overlapping, are also each of them specialised branches of agricultural production; and the calculation of the output from each branch requires the collection of separate data which are only in a partial degree available, and which it is impracticable to obtain by an annual inquiry. But beyond these main branches of farming there are now many other so-called minor branches which cannot be overlooked in considering the total production of the land, and which, with the increase of intensive cultivation, are yearly becoming of greater importance. Fruit-growing, vegetable-growing, flower-growing,

* The preliminary total figures of acreage and live stock were dealt with in this *Journal* September, 1908, p. 423, and those relating to the produce of the crops in the issue for December, 1908, p. 660.

poultry-keeping, bee-keeping, all contribute largely to the sum total of agricultural production, and of all of them the statistical information at present available is very meagre. To remedy in some degree these defects in our knowledge, and to afford a better measure of the economic position of Agriculture in relation to national wealth, are the primary objects of the special inquiries which the Board have undertaken.

Decrease in the Agricultural Area.—The shrinkage of the acreage returned as under crops and grass, *i.e.*, what may properly be termed the “farmed” area, which has steadily continued year by year for the last seventeen years, was again apparent in 1908, the loss amounting to 32,000 acres on the year. A part of this no doubt consisted of land on the economic margin of cultivation which has reverted to unproductiveness, but a large, and probably a larger, part has no doubt been withdrawn from farming for more profitable use. That the latter is the predominant cause at present appears to be indicated by the fact that, generally speaking, the loss of agricultural area has in late years been greatest in those counties where urban extension is most active. It might perhaps be expected that the restriction of agriculture by urban encroachment in some districts would be set off by its extension in other districts, and this does occur to a slight extent.

Increase in Grass Land.—The conversion of arable land into pasture proceeds with equal certainty and at much greater speed than the reduction of the agricultural area. In 1908 the plough was stopped over 170,000 acres, while, on the other hand, 138,000 acres were added to grass. The total extent of arable land, which about thirty-five years ago amounted to $18\frac{1}{2}$ million acres, has now fallen to little more than $14\frac{1}{2}$ million acres. The loss, as has frequently been pointed out, has been almost entirely in England and Wales, the reduction in Scotland having been comparatively trifling. If the average of the three years 1876–8 be taken as a standard, it will be found that since that period the loss in England and Wales has exceeded 20 per cent., while in Scotland it has been less than 4 per cent.

Number of Holdings.—The reduction of cultivated area

normally involves a decline in the number of holdings, though it is possible for it to be counterbalanced by the subdivision of farms in other districts. During the past year, however, there has been some diminution, of which details are given, together with some additional information bearing on the question of occupying ownership.

The remainder of Mr. Rew's report in Part I. refers chiefly to the changes in the acreage of crops and number of live stock, and the volume also contains the usual detailed particulars for each county and other summary tables.

The report in Part II. refers to the accuracy of the statements as to the prospects of the crops which were issued in July, August, and September, and deals among other points with the weather of 1908, the duration of the harvest, the straw crop, and the weight of grain per bushel. The produce of the crops is compared with earlier years and illustrated by diagrams.

Value of the Produce.—An estimate is made as to the value of the produce. This, as has been previously pointed out, cannot be measured with any degree of precision, and it is only possible to give figures which supply a comparison of one year with another on a basis which, although hypothetical, being the same in each year, affords a fairly reliable indication of the monetary results of different harvests. The method adopted is to value the total corn crops at the average *Gazette* prices returned during the four months September to December, and the total potato and hay crops at prices compiled from the Board's weekly return of market prices. Thus calculated, the comparison of the results of 1908 with those of 1907 appears as follows:—

Crop	1907.		1908	
	Total Produce.	Value	Total Produce.	Value.
	Qrs	£	Qrs.	£
Wheat	6,900,774	11,703,000	6,566,892	10,370,000
Barley	7,546,273	9,967,000	6,840,055	9,177,000
Oats	16,799,015	15,259,000	15,453,404	13,264,000
	Tons.		Tons.	
Potatoes ..	2,977,485	12,133,000	3,917,618	9,892,000
Clover, &c. Hay "	3,709,977	15,211,000	3,506,784	12,712,000
Meadow Hay	6,719,257	25,197,000	6,213,355	19,106,000

If these figures may be regarded as a trustworthy guide—and they may fairly be accepted for comparative purposes—the shrinkage of gross returns in 1908 as compared with 1907 must have been very considerable. It would, of course, be misleading to sum up the differences and present the total as representing a loss in receipts. In the case of the hay crop, for example, the proportion actually sold is comparatively small, and the difference in market value does not necessarily reduce the return from that consumed on the farm, which is dependent rather on the price of stock than on the price of hay. But in the case of crops such as wheat and potatoes, which are mainly sold, the drop in gross returns is an approximate measure of the shrinkage in actual receipts. It may not be precisely accurate to say, for example, that the potato crop of 1908, although exceeding that of 1907 by a million tons, was sold for nearly $2\frac{1}{2}$ million pounds less money, because the whole crop has for convenience of reckoning been valued in each year at the average prices of one typical variety, viz., “Up-to-Dates.” We are, however, fairly justified in saying that the crop, although 32 per cent. larger than in 1907, was sold for 18 per cent. less, and was therefore worth to the farmer only five-sixths of the previous year’s crop, notwithstanding the extra cost of lifting and marketing the greater bulk.

SWEDEN.—A notice dated January 2nd, 1909, and published by the Medical Authorities of Sweden, in accordance with the Royal Ordinance of December 9th, 1898, states that the importation of cattle, sheep, goats, and other ruminants, swine, and animals of the equine species, may be effected at Gothenburg, Helsingborg, Hernösand, Landskrona, Lulea, Malmö, Stockholm, Sundsvall, and Söderhamn.

**Live Stock Import
Regulations.**

CANADA.—In connection with the recent outbreak of foot-and-mouth disease in the United States, it may be noted that a Canadian Act of Parliament, entitled the Animal Contagious Diseases Act, 1903, gives full power for controlling and dealing with outbreaks of disease in that country, as well as for preventing its introduction. Section 14 provides that the Minister of Agriculture may prohibit the importation or introduction into Canada of animals, or of flesh, hides, hoofs, horns, or other parts of animals, or of hay, straw, fodder, or other articles for the purpose of preventing the introduction of disease. Other sections provide for action with a view

to the eradication of disease, and for the cleansing of vessels, vehicles, and premises. Under Section 29, the Governor in Council may make regulations for subjecting animals to quarantine, or for causing them to be destroyed upon their arrival in Canada, or for destroying any hay, straw, fodder, or other article which might convey infection.

FINLAND.—With reference to the note in this *Journal*, May, 1908, to the effect that the importation of ruminants, pigs, and animal products from Scotland into Finland had been prohibited, the Board are now informed that the prohibition has been withdrawn.

UNITED STATES.—The regulation for the importation duty free of pedigree live stock was summarised in this *Journal*, September, 1906, p. 365. The following amendment has now been made to Section 7 of the Order of the Bureau of Animal Industry No. 136, which contains a list of American Associations not affiliated with foreign associations, whose certificate of registration is accepted for free entry:—"However, associations, companies, and clubs in the following list shall accept no imported animals for registration in order to obtain free entry, unless such animals are eligible to such registration under the rules of entry prescribed for American-bred animals." A copy of the list referred to can be seen at the Offices of the Board.

CAPE COLONY.—The *Cape of Good Hope Gazette* for February 23rd contains a Proclamation (No. 88 of 1909), providing, with effect from that date, for the prohibition of the importation of any live stock into Cape Colony from any State or Territory oversea, unless such live stock are accompanied by a certificate signed by the officer in command or master of the vessel on board of which such animals are imported, to the effect that such stock—the number and general description of which must be specified—have not been shipped, landed, or transhipped at any port on the West African Coast, north of Walfish Bay.

Any live stock introduced into the Colony in contravention of the above Proclamation will be liable to be summarily destroyed, and the master of the vessel will for every animal permitted to be landed, be liable, on conviction, to a fine not exceeding £100, or in default of payment to imprisonment for a period not exceeding six months, unless such fine be sooner paid.

The Board of Agriculture and Fisheries have made an Order, under the Diseases of Animals Acts, 1894 to 1903, revoking their Orders of November 28th last, which (a) prohibited the landing in Great Britain of live animals brought from the States of Maryland and Delaware; and (b) made special provision for the examination, prior to landing, of all animals brought from the United States of America.

**Admission of Live
Stock into Great
Britain from the
United States.**

The Order of November 20th last, which prohibited the landing in Great Britain of live animals brought from the States of New Jersey and New York, in the United States of America, has also been revoked.

Animals brought from the States of Maryland, Delaware, New Jersey, and New York may now be landed at any Foreign Animals

Wharf in Great Britain for the purpose of slaughter thereat, in accordance with the provisions of the Foreign Animals Order of 1903.

The Order prohibiting the landing of live animals from the State of Pennsylvania, as well as the Orders prohibiting the landing of hay or straw from the States of New Jersey, New York, Maryland, Delaware, and Pennsylvania, still remain in force.

The Board of Trade correspondent at Cape Town (Mr. E. J. Cattell) reports (*Board of Trade Journal*, February 25th, 1909) that several

**Regulations as to
Importation of Honey
into Cape Colony.**

consignments of honey recently arriving at that port have been rejected on account of omission to comply with the terms of the Proclamation prohibiting the introduction of honey and beeswax into the Colony except under written permit previously obtained from the Secretary for Agriculture. A note of these Regulations appeared in this *Journal*, February, 1909, p. 875.

A further Proclamation (No. 87 of 1909), amending the previous Proclamation of 1908, provides for the prohibition of the importation of beeswax or foundation comb, except under a written permission previously obtained from the Secretary for Agriculture, and subject to the production in the case of each consignment of such sworn declarations, in prescribed form, as may be required.

The declarations that are required to accompany the importations of beeswax or foundation comb prescribe (1) that the wax has been melted for not less than 2½ hours at a temperature of not less than 212° F., and (2) that no bee disease of any description exists on the premises of the person making the declaration or within 2 miles thereof.

SWEDEN.—A Swedish Royal Ordinance, dated February 5th, 1909, and coming into force on June 1st next, contains the following provisions as to the importation into Sweden of foreign seeds.

**Regulations as to
Importation of Seeds.**

Sect. 1.—Foreign seed of red clover (*trifolium pratense*) and hybrid clover (*trifolium hybridum*), as well as hop seed (*medicago lupulina*), may not be imported into the country unless enclosed in sacks, marked clearly on the outside with the words "utlandskt fro" ("foreign seed"), and having previously undergone treatment with a solution of "eosin" in the manner described below in Sect. 3.

All seed imported into the country from abroad, which has not been satisfactorily proved to be Swedish seed previously exported from Sweden, is to be considered as foreign seed.

Sect. 2.—Goods received from abroad and submitted to Customs inspection as being foreign seed in accordance with the terms of Sect. 1, but not enclosed in sacks as prescribed, may be imported if the sacks are marked in accordance with Sect. 1 at the owner's expense, or the seed repacked in other sacks similarly marked.

Sect. 3.—The treatment by a solution of "eosin" mentioned in Sect. 1 shall be carried out by the respective Customs authorities before being delivered for import.

The solution shall contain 8 grammes of "eosin" (alkali salts of tetrabromofluorescein) to one litre of spirit; it should be noted that in every sack containing about 100 kilos. of seed, the solution should be injected from above in four places to the extent of about 40 cubic centimetres for each place. If the goods are enclosed in larger or smaller sacks, the number and extent of injections must be modified accordingly. The Department of Agriculture will provide the necessary instructions for the treatment.

Sect. 4.—Foreign seed of the description mentioned in Sect. 1 may not be put on sale within the kingdom by dealers in seed at any public place of sale, or be delivered to buyers without being enclosed in sacks or other coverings marked as stated in Sect. 1.

Sect. 5.—In all bills, accounts, bills of freight and of lading, broker's bills, contracts for delivery, and other similar documents concerning goods mentioned in Sect. 1, these must be clearly quoted as being foreign seed.

Other sections of the Ordinance provide penalties for contravening these Regulations.

It may be pointed out that "eosin" is a preparation which has, up to the present, been chiefly used for staining in microscopic work. The use of it in this case is to dye all foreign seeds the same colour so as to be easily recognisable and distinguishable from Swedish seeds.

UNITED STATES.—A circular of the United States Treasury Department, addressed to Customs officers, directs that until July 1st, 1909, two-ounce samples of all importations of 100 pounds or more of grass, clover, and forage-plant seeds, be forwarded to the Seed Laboratory, Department of Agriculture, Washington. The importation of the consignment and its entry into commerce will be suspended until the result of the examination of the sample is made known.

The Austrian Ministry of Agriculture wishes that attention should be drawn in those countries to which Austrian hops are exported to an Austrian Law of March 17th, 1907, and Decree of October 12th, 1907, with regard to the marking of hops.

Austrian Regulations as to

Marking Hops.

This legislation provides that any geographical designation applied to hops in the course of trade in Austria must be accurate, whether such designation is applied to receptacles containing hops or whether it is used in price-lists, business letters, bills of lading, invoices, or other documents relating to hops, such as certificates of origin, &c. Certain hop-producing areas in Austria are carefully delimited with a view to the use of such territorial designations in describing hops; other geographical particulars, such as the name of the estate or the parish where hops were produced, may be added, but in any case where a geographical designation is used the name of the State must be indicated. It is, however, provided that in the case of geographical designations in common use in the hop trade which do not accurately describe the origin of the hops, but are used to distinguish particular varieties, the application of the law may be postponed, and accordingly the regulations prescribe that the English words "Bohemian hops," when applied to hops intended for export, will not be considered a geographi-

cal designation within the meaning of the law until five years after the date when the law came into operation, i.e., until September, 1912.

Any foreign hops sold or forming an article of trade in Austria must be marked with the name of the country in which they are produced. The marking of the country of origin on receptacles containing hops must be effected in black indelible letters of a height of at least 10 centimetres in the case of bales, sacks, or boxes.

Provision is also made for the recognition of certain public institutions ("Hopfensignierhallen") which may be established by municipalities or other local authorities, or by associations, to attest the origin of hops.

His Majesty the King has appointed a Royal Commission, of which his Royal Highness the Prince of Wales is President, to assist the Board of Trade in the organisation of **Brussels International Exhibition.** exhibits illustrative of British Art, Industry, and Agriculture at the forthcoming International Exhibitions at Brussels in 1910 and at Rome and Turin in 1911. The Board of Agriculture and Fisheries is represented on this Commission by Sir Thomas Henry Elliott, K.C.B., Secretary to the Board.

The Exhibition at Brussels will open in April, 1910, and will remain open for a period of at least six months. It will include artistic, scientific, industrial, commercial, and Colonial sections. Temporary agricultural and horticultural shows, congresses, lectures, conferences, and fêtes will be arranged. The Exhibition is arranged upon a different scheme from the large international exhibitions held in recent years. At the Paris Exhibition of 1900 and the St. Louis Exhibition of 1904, a number of isolated allotments were assigned to each participating nation in buildings devoted to one group of manufactures only. On the present occasion, the exhibits of each country will be grouped together in such a manner as to form a complete national display of the various classes of manufactures comprised in the classification. An exception will, however, be made in the case of exhibits of machinery and rolling stock, which will be placed in separate buildings specially erected for the purpose.

Complete information as to the Exhibition and forms of application for space can be obtained from the Director of the Exhibitions Branch, Board of Trade, Queen Anne's Chambers, Broadway, Westminster, S.W. Application for space should be made as soon as possible, and in any case not later than the 31st May, 1909.

The general classification of the Exhibition includes the following sections relating to agriculture:—

Group I. Education and Instruction.—Class 5.—Special Instruction in Agriculture. Under this head are included exhibits bearing on higher or scientific instruction in agriculture, veterinary science, and forestry, as well as other types of agricultural education.

Group VII. Agriculture.—Class 35.—Implements and processes used in rural cultivation. (Farm buildings, agricultural engineering, machinery, tools, implements, manures, &c.). Class 36.—Appliances and processes used in vine culture. Class 37.—Appliances and

processes used in agricultural industries. (Dairies, butter and cheese factories, poultry farming, market gardening.) Class 38.—The theory of agriculture. Agricultural statistics. (Including institutions for the promotion and advancement of agriculture, experiment stations, societies, agricultural banks, insurance.) Class 39.—Vegetable food products. (Cereals, leguminous crops, roots, &c.) Class 40.—Animal food products. (Butter, milk, cheese, eggs, dairy appliances, and accessories.) Class 41.—Non-edible agricultural products. (Textile and other industrial plants, hops, wool, bristles, hair, feathers.) Class 42.—Useful insects and their products. Destructive insects and parasitic plants. (Systematic collections of insects and vegetable parasites, appliances and processes for destroying cryptogamic plants and injurious insects, bees, silkworms.)

Group VIII. Horticulture and Arboriculture.—Class 43.—Appliances and processes used in horticulture and arboriculture. Class 44.—Kitchen garden plants. Class 45.—Fruit trees and fruit. Class 46.—Trees, shrubs, ornamental plants, and flowers. Class 47.—Greenhouse plants. Class 48.—Horticultural and nursery seeds and stock.

Group IX. Forests. Sport. Fishing. Gathering Wild Crops.—Class 49.—Appliances and processes used in forestry. Class 50.—Products of the cultivation of forests and of forest industries. Class 54.—Products of wild crops and appliances for gathering them. (Mushrooms, truffles, edible wild fruits, plants obtained without cultivation and used by chemists, dyers, &c.)

Group X. Food Products.—Class 55.—Plant and processes used in the preparation of food products. (Flour mills, bakeries, breweries, distilleries, &c.) Class 56.—Farinaceous products and their derivatives. Class 57.—Bread and pastry. Class 58.—Preserved meat, fish, vegetables, and fruit. Class 62.—Miscellaneous beverages. (Cider and perry.)

Group XIV. Chemical Industries.—Class 89.—Leather and hides.

Group XVI. Social Economy.—Class 103.—Large and small industries. Co-operative associations of production or credit.—Class 104. Co-operative provision societies. Class 105.—Farming on a large and small scale. Agricultural associations. (Division of property and the working of land, land transfer, land tenure, condition of the labourer and tenant farmer, movement of population, agricultural societies for purchase and sale, agricultural credit banks.)

It is thought that this Exhibition will afford a valuable opportunity of promoting and extending British trade, and in view of the important scale on which other nations are preparing to participate, it is hoped that every effort will be made throughout the United Kingdom to furnish a creditable and representative display of exhibits. Exhibits will be welcomed from makers of agricultural machinery, poultry and dairy appliances, fertilisers, cattle and poultry foods, and agricultural chemicals, and from producers of potatoes, seeds and plants, skins and wool.

The temporary shows of agricultural and horticultural produce, of which particulars will be announced at a later date, will afford an opportunity to British exporters of live stock and poultry to bring their produce under the notice of Continental agriculturists.

Horticultural Exhibition in Holland.—The Board of Agriculture and Fisheries are informed, through the Foreign Office, that a Horticultural Exhibition will be held at Zeist, Holland, from

Agricultural Exhibitions Abroad. August 25th to September 16th, 1909. It is stated that the Exhibition will be on a large scale, and that both State and Provincial subsidies will be granted to it. The Central Committee invite the participation of foreign countries, both as regards exhibits and visitors, with a view to extending commercial relations.

Agricultural Exhibition at Prague.—The Central Agricultural Society of Bohemia is organising an Exhibition at Prague from May 29th to June 6th, 1909. It will include machinery, live stock, poultry, fertilisers, dairying, and all other branches of agriculture, and it is stated that it will form the largest live stock and machinery market in Austria-Hungary. Communications should be addressed to La Société centrale d'Agriculture, Vodickova ul. 38, Prague, Bohemia. A copy of the Programme can be seen at the offices of the Board of Agriculture, 8 Whitehall Place, S.W.

During the month of March the weather was of a wintry and severe nature. During the *first* week the temperature was much below the average, the deficiency being as much as ten

Notes on the Weather and Crops during March.

degrees in some districts. The thermometer fell to zero at Marlborough, and even colder records were obtained on the grass in other places. Rainfall was, as a rule, "heavy" or "very heavy," and sunshine was "scanty" or "moderate." There were no day-degrees above 42° for the whole week. The *second* week continued to be cold, and falls of snow occurred in many places. Warmth was "deficient" everywhere, except in England E. and Scotland W. Sunshine was "scanty" or "very scanty" throughout Great Britain. Rainfall exceeded the average in England N E and Scotland E, but elsewhere it was "moderate" or "light." There were no accumulated day-degrees above 42° in the Eastern Section of Great Britain, and only one in the Western. In the *third* week the weather improved in some places. Warmth was "deficient" everywhere except in England E., which, however, was the only district with more than the normal rainfall. Sunshine was much above the average in the West, but in the East it varied little from the average. The *fourth* week was very unsettled, with rainfall "heavy" in all districts except Scotland W., and "very heavy" in England S.W. Sunshine was "scanty" everywhere, except in England S.W. and N.W., where it was moderate.

Reports from correspondents in Berkshire show a very backward season. One states: "Sowing absolutely behindhand. Many farmers have not sown a handful, and March ends with the land wet and sticky. The rosy state of things in January and February has now disappeared, and cultivators are anxious to commence seeding, as the season is now far advanced. Grasses do not appear to have suffered from the long spell of cold, and grass has already commenced to spring. Gardens are very bare of green stuff, and must be so for some time ahead. Last year's crop of wheat is practically threshed out; the grow-

ing crops stand well. Our brooks and rivers are yet very low." In order to show the backwardness of the season a correspondent has supplied the following statement:—

Dates of sowing onions, carrots, and parsnips in a well-kept garden having easy-working soil—the earliest chance of good sowing being taken:—

Year.						Date of Sowing.
1901	...	...	...	...	...	March 16th.
1902	...	...	...	...	...	March 5th.
1903	...	...	...	...	...	March 26th.
1904	...	...	...	...	...	March 14th.
1905	...	...	...	...	...	February 25th.
1906	...	...	...	...	...	March 6th.
1907	...	...	...	...	...	March 1st.
1908	...	...	...	...	...	March 13th.
1909	...	...	...	...	...	No chance of sowing properly all through March.

Argentina.—According to a despatch from the Chargé d'Affaires at Buenos Ayres, dated February 1st, the harvest was being reaped under most favourable circumstances, and reports, with regard to the maize crop were very reassuring. The Ministry of Agriculture estimated the total yield at about six million metric tons. The past year is regarded as the best yet recorded in both the pastoral and agricultural industries.

Notes on Crops Abroad.

Italy.—A report received from the Acting British Consul-General at Naples (Mr. G. Turner) states that agriculture in Southern Italy has languished during 1908 owing to a drought such as has not been known within the memory of man. Among the crops which have failed are the corn crops, including maize, of which some 9 million acres are planted annually, while the green crops, including hemp, flax, lucerne, and beans, are seriously affected. The scarcity of corn will necessitate a large importation. (*Board of Trade Journal*, March 4th, 1909.)

New Zealand.—H.M. Trade Commissioner in New Zealand (Mr. G. H. F. Rolleston) reports (*Board of Trade Journal*, March 18th, 1909) that the season has been a splendid one for all classes of farm produce, and that the output of wool, meat and butter will be unusually large. Abundance of grass ensures a good season for fattening, and heavy cargoes of mutton and lamb are going forward; the prices are well up to the average. The dairy industry is having a record season, and the quantity of butter and cheese exported will far exceed the output of any previous year.

A later report given in the *Board of Trade Journal* (April 1st) states that there is every prospect of an exceptionally heavy yield of grain. The area under crops this season is much larger than usual, and in spite of the damage done in some instances by wet, the average return per acre should be heavier than is usually the case. In Canterbury

alone there are 40,000 acres more in wheat than in the previous season. Merchants expect that wheat will be exported from New Zealand in some quantity this year. For the last five or six years practically no wheat has been exported, the high prices ruling for wool and mutton causing farmers to devote their attention mainly to sheep.

Russia.—H.M. Consul-General at Odessa (Mr. C. S. Smith) has forwarded the following particulars of the prospects of the coming harvest in Russia, taken from the *Torgovo-Promyshlennaya Gazeta* of February 17th (March 2nd):—

The information collected by the Central Statistical Committee for January 10th/23rd last is to the effect that the condition of the young shoots of the winter grain may be considered as safe in fifteen provinces where they entered the winter in a satisfactory condition, and where an early and effective snow-cover protected them, viz, in Archangel, Vologda, Kazan, Kursk, Moscow, Nijni-Novgorod, Orenburg, Penza, Podolia, Poltava, Simbirsk, Ufa, Irkutsk, Tobolsk, and Tomsk.

As to the probable safety of the winter crops in the other fifty-two provinces and districts, no such definite estimates can be made, partly because even in the autumn the shoots were already in a somewhat unsatisfactory state, and also because the snow-cover formed too late or was too shallow to protect the young grain.

Roumania —Mr. Oliver Wardrop, British Consul at Bucharest, reported on March 9th that on account of the persistent frost and snow of the last month the usual spring labour in the fields had not been possible anywhere, and owing to the poor condition and scarcity of cattle, farmers were afraid that they would not be able to get through their field work in time. The latest official figures show that the area sown in the autumn of 1908 was:—Wheat, 3,919,000 acres; rye, 303,000 acres; barley, 184,000 acres; rape, 324,000 acres.

These figures, which are only provisional, show a considerable diminution compared with the two preceding years. The state of the autumn sowings was fairly good at the date of this report.

United States —The Department of Agriculture has estimated the potato crop in 1908 at 279,000,000 bushels, about 10 per cent. less than in 1907. According to a statement in the *Crop Reporter* for February last, the stock in growers' and dealers' hands was proportionally about 12 per cent. less on January 1st, 1909, than on the same date in 1908.

The official Report issued on April 7th gives the condition of winter wheat on April 1st last as 82 2, compared with 91 3 on the same date in 1908 and 89 9 in 1907.

The Board of Agriculture and Fisheries have been furnished by the Board of Trade with the following report, based on about 210 returns from correspondents in various districts, on the demand for agricultural labour in March.

**Agricultural Labour
in England
during March.**

Although work was found for the regular farm servants, the unfavourable weather which lasted for the greater part of March caused day labourers to lose time in most parts of England, and the demand

for their services was also lessened in many districts by the forward state of farm work.

Northern Counties.—In *Northumberland* and *Cumberland* outdoor employment was much hindered by the severe weather, and spring sowings were delayed in consequence; there was little demand for extra labour. At the March hirings in *Northumberland* wages showed comparatively little change from the previous year; some scarcity of women workers was reported. A fairly even supply of, and demand for, labour were reported from districts in *Westmorland* and *Lancashire*. Potato planting and other work afforded employment to extra labourers in *Yorkshire* when the weather permitted, but snow and rain caused a somewhat considerable loss of time to many men of this class.

Midland Counties.—Severe weather interrupted the employment of day labourers in *Cheshire* during the early part of the month, otherwise the supply of this class of labour was generally equalled by the demand. There was a fair demand for extra labourers in *Derbyshire* and *Nottinghamshire*. Threshing, hedging, manure carting, etc., provided a certain amount of work for extra men in *Leicestershire*, but the demand for their services was much diminished by the severe weather. Similar reports come from *Staffordshire*. There was generally an even supply of and demand for labour in *Shropshire*, though there was occasional loss of time through bad weather. In *Worcestershire* and *Warwickshire* the supply of extra labourers was generally in excess of the demand, but a scarcity of men for permanent situations was reported from several districts. Extra labourers were in excess of requirements in *Northamptonshire* and *Oxfordshire*; there was, however, a continued demand for carters, cattlemen and shepherds in the latter county. Threshing, draining, hedging and other work caused a moderate demand for day labourers in *Buckinghamshire*, *Hertfordshire*, and *Bedfordshire*, but there was generally some surplus in the supply, and bad weather occasioned much loss of time.

Eastern Counties.—Outdoor work in *Huntingdonshire* and *Cambridgeshire* was interrupted by unfavourable weather, while in several districts many more men were seeking work than were wanted. There was generally an equal supply of and demand for day labourers in *Lincolnshire*, except for a few days when bad weather rendered work impossible. Threshing, hedging, ditching and manure carting provided a fair amount of employment in *Norfolk*, though there was some loss of time from bad weather in most districts. The forward state of threshing, as well as the weather, was said to have affected the employment of day labourers in *Suffolk*, and the supply of such men was generally somewhat in excess of the demand. Correspondents in *Essex* also report that day labourers lost time on account of bad weather.

Southern and South-Western Counties.—Day labourers were in irregular employment in *Kent*, owing to the severe weather, which considerably interrupted threshing and other work. A scarcity of shepherds was reported from the Bridge Union. There was a similar irregularity of employment in *Surrey*. Wood-cutting, hedging, ditching, manure carting, etc., caused a moderate demand for extra labourers in *Sussex*, but a number of such men suffered loss of time from the bad weather. There was a fair demand for day labourers in *Hampshire* and *Berkshire* when the weather permitted outdoor work. A corre-

spondent in the latter county states that the demand was also somewhat affected by the forward state of work. Day labourers in *Wiltshire* occasionally lost time owing to bad weather, and there was generally some surplus of this class of labour. Hedging and threshing provided a fair amount of employment for day labourers in *Dorset* when the weather permitted. Frost and snow interrupted outdoor work in *Somerset*, and there was generally but little demand for extra men. Similar reports come from *Herefordshire*, but correspondents state that men for permanent situations involving Sunday work were still somewhat difficult to secure. Threshing, hedging, ditching, and manure carting provided a moderate amount of employment for extra labourers in *Gloucestershire*. In *Devon* and *Cornwall* extra men were in fairly regular employment at preparing the land for spring sowing, hedging, and other work, though several men lost some time through bad weather. Some scarcity of men for permanent situations was generally reported, but a correspondent in the Newton Abbot Union (*Devon*) states that such men are becoming more plentiful.

MISCELLANEOUS NOTES.

Dew-ponds.—With reference to previous notes on this subject (*Journal*, June, 1906, p. 181; November, 1907, p. 498; and January, 1908, p. 630), it may be mentioned that a paper on "Dew-ponds," which was read before the Royal Society of Arts by Mr. George Hubbard, F.S.A., F.R.I.B.A., appears in the *Journal of the Society*, March 5th, 1909.

Forestry in China.—The *Board of Trade Journal* (March 11th, 1909) contains information respecting the working of the Yalu Forests, which are now in process of development by a Japanese company. It is stated that under Japanese management, it is hoped that the forests of the Yalu will now take the prominent place they deserve in the lumber market of the world.

Methods of Slaughtering Animals.—A description of the methods employed in various Continental countries to slaughter animals is given in the United States Consular Reports, Nos. 3298-3301. The processes adopted in France and Germany are given in considerable detail.

Flour Milling Industry.—A Special Agent (Mr. M. H. Davis), of the United States Department of Commerce, has been investigating the conditions of the flour milling industry in Europe, and his reports have appeared in various issues of the United States Consular Reports. The trade in the United Kingdom is dealt with in Nos. 3215, 3220, 3226, 3231, 3238, 3267, 3274, 3280, and 3286, in which the condition of the industry is described and suggestions made with a view to encouraging the importation of United States flour. These reports can be inspected at the offices of the Board, No. 8 Whitehall Place, S.W. The conditions of the industry in Germany, Denmark, Holland, and Sweden are also dealt with in other reports.

It is of interest to observe that in discussing the causes which handicap American trade in flour (No. 3373), Mr. Davis lays special stress on the desirability from an American point of view of substituting the export of flour for the present export of wheat.

OFFICIAL CIRCULARS AND NOTICES.

In connection with the Census of Production to which reference has been previously made in this *Journal* (May, 1908, p. 81; November, 1908, p. 631), information is being collected by **Census of Production.** the Board of Agriculture and Fisheries as regards poultry, market garden crops, crops grown under glass, and the production of fruit.

Poultry.—A number of representative poultry keepers are being asked to state, as regards the number of fowls, ducks, geese, and turkeys on their farms, the number hatched before 1908, and the number hatched in 1908; together with the number of eggs (1) produced on the farm, (2) sold for consumption, and (3) sold or used for hatching, during the twelve months ending September 30th, 1908; and also the number of birds sold during the year.

Miscellaneous Crops.—In this schedule the Board desire to obtain particulars of area, production, and value as regards certain crops, such as rye, beans, peas, buckwheat, cabbage, &c., of which the acreage is returned every year, and also regarding the acreage and production of all other kinds of produce from the soil, excluding fruit, woven osiers, and hops, which are being dealt with separately, and was excluding the main crops, such as wheat, barley, roots, &c. and

Information is desired, not only as regards the ordinary field crops of also as regards vegetables (cauliflowers, celery, mustard, mint, ported tomatoes, flowers grown for market, grass seeds, watercress, ments produce of nursery gardens, &c., &c. In the case of small are, inued which a great variety of produce is grown, which cannot be separaty. distinguished, the total value is asked for; but generally, the infoerate tion is desired in as much detail as is possible. e, and

Crops grown under glass.—In this schedule occupiers are asy, and state the amount and value of grapes, peaches, tomatoes, cucumbe... and other kinds of fruit, flowers, and vegetables grown under glass.

Fruit Crops.—This schedule covers the area, production, and average yield of strawberries, raspberries, currants, gooseberries, and other kinds of small fruit, and of apples, pears, cherries, plums, nuts, and other kinds of orchard fruits.

In addition, occupiers are asked to state the number of persons temporarily employed in fruit picking during the season, showing the number employed for small fruit and orchards, males and females above and below eighteen years of age respectively.

Another question deals with the production of cider and perry, the quantity of fruit used, the quantity and value of the cider and perry produced, and the value of the produce sold.

With a view to obtain fuller information as to the stock of horses in the country, and having regard to the proposals now under consideration for the encouragement of horse-breeding in Great Britain, the Board of Agriculture and Fisheries are endeavouring to obtain more detailed particulars than those furnished annually for the purposes of the Agricultural Returns. The particulars

**Horse-breeding
Return.**

asked for are the number of stallions, mares, geldings, and foals, according to breed, viz., Thoroughbreds, other light horses, and ponies; Shires, Clydesdales, Suffolks, and other heavy horses. Columns are provided for a return, classified in the same way, of horses kept for pleasure or business purposes, which do not come within the scope of the Agricultural Returns. "Other Light Horses" are considered for the purpose of classification to include horses of the Vanner, Cleveland Bay, and Coach-horse type, and also cobs of not less than 15 hands. Only pure-bred horses, *i.e.*, those registered, or eligible for registration, in the respective stud-books, are to be entered under the headings of Thoroughbreds, Shires, Clydesdales, and Suffolks.

A reprint of the article, which appeared in this *Journal* for August last, describing, with illustrations, the types of horses ordinarily required for Army purposes, is being circulated with the application for information.

In the Report on the Agricultural Statistics for 1908, Part I., it is explained that the object of obtaining this information is two-fold. It will enable a calculation to be made with a closer degree of accuracy than has hitherto been possible of the total stock of horses kept on the land, and of the annual production of different classes of horses. Further than this, it will provide the Board with valuable information in connection with the scheme now under consideration for the encouragement of horse-breeding in Great Britain; and will facilitate the establishment of a register of the owners of suitable stallions and brood mares of different breeds, which is the initial step towards the foundation of a system for the improvement of horse-breeding.

The importation of currant bushes into Great Britain is now sanctioned by the American Gooseberry Mildew (Prohibition of Importation of Bushes) Amendment Order of 1908 (No. 2), provided that a licence of the Board of Agriculture and Fisheries granted under that Order is produced at the point of landing. Such licences are issued on certain conditions, which require the following requirements to be carried out —

(1) Requirements to be carried out by the exporter:—

- (a) The bushes are to be cleansed of all earth before being packed up.
- (b) The bushes are to be firmly and suitably packed in such a way that they cannot come in contact with any other bushes on the journey; but in order that they may be inspected at the port of landing by the Custom House Officer to see if the package contains contraband goods, they must be packed in such a way that one end of the package can be opened and, after the contents have been examined, be closed up again. The package should bear a label to show where it should be opened. It is suggested that the following words should be used: "Open here for Customs examination." It is preferable that the words should be in English.

- (c) The name and address of the sender should be put on the address label as well as that of the consignee, and the words "Currant Bushes only" should be clearly written or printed on the label, thus :—

Currant Bushes Only.
From M. BRUN ET CIE.,
 Pépiniéristes,
 Orleans,
 France.
 To Messrs. BROWN & Co.,
 Nurserymen,
 Reading,
 England.

- (d) No other plants should be included in the package.
- (e) The bushes should not be despatched till the sender is satisfied that a licence has been issued.
- (2) Requirements to be carried out by the importer :—
- (a) A guarantee should be procured from the exporter that the bushes are free from American Gooseberry Mildew, Black Currant Mite, and other disease.
- (b) A letter should be written to the Board of Agriculture and Fisheries, 4 Whitehall Place, S.W., applying for a licence to import currant bushes. The letter should state :—
- (1) The kind of bush to be imported, *i.e.*, whether red, black, and so forth.
 - (2) The approximate number to be landed (an outside number should be given).
 - (3) The proposed date of landing.
 - (4) The proposed port of landing (one or more ports may be given, but the number should not exceed three).
 - (5) The name and address of the exporter.
 - (6) The name and address of the person or firm on whose premises the bushes are to be planted.
 - (7) The address of the place where the bushes are to be permanently planted. This address should be full, so that the place can easily be found by an inspector visiting the district.
 - (8) An assurance that the guarantee of freedom from disease referred to above has been obtained.
 - (9) If the writer is not the person on whose premises the bushes are to be planted, a written undertaking to observe the conditions of the licence as described in this memorandum must be forwarded with the application.
 - (10) The address to which the licence is to be sent should be given.
- (c) When the licence is received, the sender should be instructed to despatch the bushes. The licence should be sent either to him to be forwarded with the package or to the Collector of Customs at the port where the bushes are to be landed. The bushes cannot be landed until the licence has been produced.

- (d) The Collector should be asked to initial the licence to show that the bushes are landed, and the licence should then be returned to the Board.
- (e) The bushes should be sent direct to their destination, and on their arrival planted as soon as possible. The Board should be informed of their arrival.
- (f) The bushes must be shown to any Officer of the Board or Local Authority who requires to see them.

If the bushes are to be consigned to Ireland, the sanction of the Department of Agriculture and Technical Instruction for Ireland must also be obtained.

SUMMARY OF AGRICULTURAL EXPERIMENTS*

EXPERIMENTS WITH CEREALS.

Varieties of Wheat (Univ. of Leeds, Bull. 74).—Trials with varieties of wheat have been carried on at this centre for ten years. In 1908 seven varieties of English and one of Canadian wheat were grown. White Stand-Up produced the best yield of grain ($63\frac{1}{2}$ bus.), and seems to be a variety very well suited to land in good condition. An examination of the grain samples showed that it had neither the strength nor the percentage of flour of Standard Red or Squarehead's Master, but the difference in value on this account is not estimated to be more than 1s. per qr. Standard Red and Browick Grey Chaff gave equal yields ($56\frac{1}{2}$ bus.), and as regards quality were classed first and third of the red wheats. The same stock of Squarehead's Master has been grown on the farm for ten years, and does not appear to have deteriorated. It gave a yield of $54\frac{1}{2}$ bus. in 1908.

Six varieties have now been grown for nine or ten years on the farm, and have given the following average yields:—Squarehead's Master (1st year seed), $41\frac{1}{2}$ bus.; Browick Grey Chaff, $41\frac{1}{2}$ bus.; Carter's White Stand-up, $40\frac{1}{2}$ bus.; Squarehead's Master (2nd year seed), $39\frac{1}{2}$ bus.; Webb's Standard Red, $39\frac{1}{2}$ bus.; Garton's Red King, $36\frac{1}{2}$ bus.

Duluth (Canadian) wheat has been grown for five years from stock imported and sown in 1903. The yield rose from 18 bushels in 1904 to $36\frac{1}{2}$ in 1906, and $35\frac{1}{2}$ in 1907 (a less favourable year), but fell to $24\frac{1}{2}$ in 1908, a drop which cannot apparently be attributed to season. The hope that Duluth would improve in yield through continued growth in an English climate does not seem, therefore, to have been fulfilled.

Improvement of Wheat (Report of Home Grown Wheat Committee of National Assoc. of British and Irish Millers, 1907).—Summaries of the report for the year 1906 have been given in this *Journal*, November, 1906, and November, 1907. In the report for 1907 it is stated that the

* A short review or summary of the experiments carried out in this country, classified according to subject, is given monthly. (The first appeared in the issue for September, 1908.) This summary is not intended to do more than give a brief indication of the character of the experiment and of the conclusions reached. Those who are interested in any particular investigation can refer for further details to the original publication. The Board would be glad to receive for inclusion in this summary copies of reports on inquiries, whether carried out by agricultural colleges, societies, or private persons.

results of the experimental work carried on by the Committee have shown :—

(a) That manuring, as ordinarily practised by farmers, and the rotating of crops, have no appreciable beneficial effect on the quality of wheat.

(b) That, under conditions in all other respects identical, autumn sown wheat is as strong as spring wheat.

(c) That when wheats grown under identical conditions were cut at varying stages of ripeness, bakehouse and laboratory tests did not disclose a superiority in strength due to early cutting.

(d) That, subject to variations due to the influence of soil and climatic conditions, breed was the predominant factor in the production of strength in wheat.

(e) That a few among very many varieties of strong foreign wheats retain, when grown in England, their inherent strength, and that, among the few, Fife is pre-eminent for the retention of its great strength.

(f) That the principles of Mendelian selection have been successfully applied to wheat, and that among many "points" which can be handled as separate units, independently of other "points," are strength and weakness, susceptibility and immunity to disease, and colour of the skin.

The principal work of the Committee, therefore, in recent years has been to continue their tests of the few wheats which have hitherto maintained a great strength when grown in England, to see :—

(a) Whether in subsequent seasons they still maintain their strength.

(b) Whether any of them can be, without hybridising or selection, grown profitably by farmers in England.

(c) Whether, in the event of their being unsuited to the requirements of farmers generally, they can be improved by selection only. Concurrently, the Committee is proceeding with the work of hybridising and selection on Mendelian lines, and to this section of its work it attaches supreme importance.

Information is given as to the progress of the work in 1907. The reports received from farmers who are growing Red Fife Wheat are set out in detail, and it appears that though the appearance and strength of the Red Fife Wheat grown in 1907 were affected by the unfavourable season, its strength was very substantially greater than that of English wheats. The best sample was one grown for its fifteenth consecutive year in England. The Committee recommend that Fife should be sown much more thickly than ordinary English varieties.

The work of building up varieties to combine strength, high cropping power, and good straw is being continued by Prof. Biffen, while the causes of strength in flour are being further investigated by Professor Wood.

Rate of Sowing of Red Fife Wheat.—(*Journal of South-Eastern Agricultural College, Wye.* No. 17, 1908).—These experiments arose out of those of the Home Grown Wheat Committee. A comparison was made in the first place between Red Fife and Squarehead's Master, and it was found that Red Fife had an average of 44·8 stems to a foot length, while Squarehead's Master had only 29·4. The question,

therefore, arose how this thick plant was caused. The number of grains to the bushel were found to be 694,983 in the case of Red Fife, and 567,831 for the other variety, so that a portion of the thicker plant appeared to be due to the smaller seed and the greater number sown, and the remainder to the higher tillering power.

Four plots, measuring $\frac{1}{4}$ acre each, were drilled at the rate of 1, 2, 3, and 4 bushels per acre, six inches between the rows; and one plot of $\frac{1}{4}$ acre was drilled at the rate of $2\frac{1}{2}$ bushels per acre, twelve inches between the rows. The results as regards yield and straw were as follows:—

Plot.	Seed per Acre. Bush.	Yield of Whole Grain. Bush.	Straw. Cwts.
1	4	55	46
2	3	51 $\frac{1}{2}$	43
3	2	48	36 $\frac{1}{2}$
4	1	41 $\frac{1}{2}$	30
5	$2\frac{1}{2}$	44 $\frac{1}{2}$	35 $\frac{1}{2}$

The straw was thickest and of the best quality on Plot 5, Plot 4 taking the second place, and Plot 1 being the worst. This appears to show that space improved the general quality. The ears were larger in the thinly sown than in the other plots, the latter having numbers of small sterile ears, and it may be inferred that thin-sowing encourages and promotes tillering, and favours size in the ears. As will be seen, however, the highest yield, both as to grain and straw, was obtained from the thickly sown plot. Another experiment was carried out to compare the tillering properties of Red Fife with those of an English wheat.

Varieties of Wheat (Beds. C.C. Educ. Comm., Bull. No. VII. Report on Wheat Plots, 1908).—Fourteen plots of $\frac{1}{4}$ acre were drilled at the rate of 2 bus. per acre, and the following were the best yields obtained in bushels per acre:—Rivett, 67; Kinver Red, 54; White Stand-up, 52; Red Stand-up, 52; Squarehead's Master, 49; Red Standard, 48. Red Fife gave 38 bushels, the low yield being partly due to the fact that it was the earliest, and was consequently badly attacked by sparrows. To test the effect of thick seeding of Red Fife, two other plots were sown, one at the rate of 3 bus. per acre, the yield of which was 41 bushels per acre, and the other at the rate of 4 bushels per acre, the yield of which was 36 bushels, as compared with 38 bushels from drilling 2 bus. per acre. The use of 4 bushels per acre here resulted in a lower yield, the reverse of the results at Wye, which are referred to above.

Manuring of Wheat and Barley (Rothamsted Exper. Stat., Ann. Supplement for 1908).—This publication gives the yields per acre for 1907 of the experimental fields at Rothamsted.

Varieties of Barley (Midland Agric. and Dairy Coll., Reports on Experiments, 1907-8).—These trials have been carried on for three years in Lincolnshire. In 1907, Hanna, Binder, and Archer's Chevallier, which gave the best results in the previous years, were again tested, and Danish Archer was tried for the first time. Danish Archer and Archer's Chevallier produced the most valuable crop per acre. Binder was the only variety that produced a malting sample. It is observed

that as far as the trials have gone they point strongly to the fact that Chevallier is capable of producing the heaviest yield of grain, but such grain is on some soils, and in dull seasons, not of the best quality. In the Lindsey Division, where these trials were conducted, barleys of the Goldthorpe type generally produced better samples of grain than the Chevallier.

Barley Growing and Selection (Journal of Irish Dept. of Agric., October, 1908).—Variety tests have been conducted for several years in all the barley-growing districts of Ireland, with the view of ascertaining the most suitable variety for different localities. In a very short time, Archer demonstrated, and has since maintained, its superiority in yield on the generality of barley soils. On heavier soils, however, and in wet seasons, Goldthorpe proved its equal at some centres, and its superior at others. Standwell, during the whole period of experiment, fell considerably below both Archer and Goldthorpe in yield, while Chevallier, the usual type of barley then in general use, showed a decided inferiority to either of the two types. Both Standwell and Goldthorpe proved to be slightly better malting material than Archer, while this variety and Chevallier were about equal in value.

The botanical characters of the varieties and various methods of selection for the improvement of seed are discussed.

COLONIAL AND FOREIGN EXPERIMENTS.

Excretion of Poisonous Substances by the Roots of Plants. (Memoirs of the Department of Agric. in India, 1908, Botanical Series, ii., No. 3).—These investigations have been carried out by Mr. F. Fletcher, Deputy Director of Agriculture, Bombay Presidency, and were suggested by observations made both in Egypt and India which pointed to the fact that materials injurious to some crops were excreted by the roots of certain other crops. Mr. Fletcher considers that the following conclusions may be drawn from his experiments:

(1) All plants excrete substances which are toxic, both to themselves and to other species; (2) the quantity of toxic material excreted by the different crops varies, when reckoned per unit area of a field sown in the ordinary way; (3) sensibility to the excreted substance varies with the plant; (4) the substance excreted by all crops is apparently identical. The nature of the substance, which may be an alkaloid, is being investigated. The toxic substance appeared to have an injurious effect on adjacent crops according to the extent to which it was distributed through the soil, while its effect on subsequent crops grown on the same land would depend on the extent to which the roots came into contact with it, especially by occupying the same layer of soil.

Preservation of Unfermented Apple Juice. (U.S. Dept. of Agric., Bureau of Chemistry, Bull. No. 118).—It is stated in this publication that the consumption of fresh fruit juices is increasing in the United States, and that the increase would be more rapid but for the objection to the use of chemical preservatives in products of this kind. Investigations have, therefore, been carried out to test the effect of the sterilisation of apple juice, and they appear to show that by this method these juices may be perfectly preserved in small or large quantities.

The experiments showed that apple juice can be sterilised in wooden containers, such as barrels, kegs, &c., in which it was found that the product remained sound for six months. The juice so prepared was palatable, and acceptable as a summer drink. The use of tin vessels, which can be sealed by a mechanical process, excluding all metals except the tin of the can from contact with the juice, was also successful. Apple juices were canned and sterilised by heating in hot water up to 149° F. These juices possessed only a slight cooked taste due to the heating, and retained much of their distinctive apple flavour. It was found that from finely flavoured apple juice a first-class sterile product could be made, while a poorly flavoured apple juice yielded an inferior product. The juice can also be sterilised in bottles. In this case the sediment in the juice must be removed, which can be done to a large extent with a cream separator. The results of extensive tests in clarifying the juice by means of a separator are given, and also an account of experiments in carbonating apple juice, and in the use of benzoate of soda as a preservative.

Absorption by Soils. (U.S. Dept. of Agric., Bureau of Soils, Bull. 52).--In this Bulletin the work on absorption by soils, which has been in progress in the Bureau for some years, is continued, and a further and more complete study is made of the composition of the solutions and the quantity of material removed from solution by the soil. The literature upon the subject of absorption is also brought together.

The object of these investigations has been to determine how absorption controls the concentration of the soil solution, which is the nutrient medium upon which plants feed, and, further, to determine the effect of absorption upon the structure of the solid portion of the soil in modifying its power to hold and maintain the soil solution for the continued use of the plant.

In the experiments described, the materials used have not always been fertilisers or constituents of the soil itself, since other substances, particularly certain dye stuffs, are better for the purpose of obtaining a more detailed knowledge of the mechanism of absorption. It is stated that, in general, where disturbing influences are not great, the rate of absorption and distribution of a material in the soil may be expressed by a mathematical formula. The disturbing influences, however, are important in most cases actually met with in practice. The most important is the change in the physical character of the soil itself, consequent upon the absorption of the dissolved materials. In some cases, notably with acids and with lime, the soils assume a "flocculated" structure, *i.e.*, a great many of the ultimate grains form larger aggregates or "ball together"; and in other cases, especially with alkalis, the soils are deflocculated, each grain standing out separate and distinct from the others. This change in the structure of the soil is of the utmost importance in influencing the physical condition of the soil, which in turn influences the drainage condition, the aëration of the soil, its capacity to hold the soil solution and control its movement through the soil, the composition of the soil solution, the character and rate of the chemical changes taking place in the soil solution; and, in fact, in influencing directly both the physical and

chemical factors which are of the greatest importance in governing the proper growth of plants.

Absorption of Manurial Constituents by Soils. (*Bulletin Mensuel, Ministère de l'Agriculture, France.* January, 1909.)—In the course of some manurial experiments, conducted by Messrs. Rousseau and Brioux, with sandy soils in the Auxerrois, the results of the application of chemical fertilisers were found to vary considerably, and this variation was not always explained by differences between the soils in chemical composition. The quantities of fertilising materials removed by water passing through the soil were first ascertained, and this raised the question of the mechanism of absorption and the influence of the chemical and physical composition of the soil thereon. The question of the distribution of phosphoric acid in the soil, and the absorption of this material and of potash are specially dealt with. The soils were light sands, of the Greensand formation, and were, generally speaking, very poor in fertilising matter, but other soils were used for comparative purposes.

The experiments showed that, as is already recognised, certain manurial constituents, such as nitrates, sulphates, chlorides, and lime, are freely washed out by drainage water, while potash is retained, the proportion removed depending on the original richness of the land in potash and the quantity applied in manures. The loss of phosphoric acid, the least soluble manurial constituent, was materially affected by the presence of lime. One type of soil, very poor in lime, slightly clayey, and fairly rich in phosphoric acid, gave very high proportions of phosphoric acid in solution. This loss in solution was reduced to less than half by the application of basic slag, at the rate of 8 cwt. per acre, and almost stopped by a dressing of lime at the rate of one ton per acre. It is concluded, therefore, that on sandy soils the application of basic slag is to be preferred to super-phosphates.

It was also found that the application of chemical manures to soils of this type resulted in an appreciable quantity of silica being dissolved. In dry periods this has a tendency to cement the surface into a hard crust which, unless it is broken up by cultivation, prevents the penetration of rain.

It is suggested that a determination of the available constituents of the soil that are soluble in weak acids, and in some cases the examination of soil solutions, would often explain the results of field trials, which cannot be understood from a mere analysis of the total fertilising constituents.

Manuring of Plants in Pots. (*Bulletin Mensuel, Ministère de l'Agriculture, France.* January, 1909.)—M. Petit, Professor at the National School of Horticulture at Versailles, observes that from his experiments it appears that nitrogenous manures are absolutely necessary in pot culture, even when, as is the case in practical horticulture, soil rich in organic matter is used. This is due to the small quantity of earth available for the plants, the feeble nitrification, owing to the earth being left undisturbed, combined with the washing out of nitrates, which takes place to a minute extent each time the pots are watered. In these experiments the best quantity of fertiliser to apply was tested, nitrate of soda being used. The quantity producing the

best results differed for different plants, some being more easily injured by an over-dose. In a larger pot, however, more could be given with benefit. As would be expected when earth richer in organic matter was used, the benefit from the fertiliser was less and an over-dose more injurious. With such earth, nitrate of soda should not be applied so soon, and then only in moderate quantity. It is recommended that the dose of nitrate should not exceed $\frac{1}{2}$ grammes for pots 11-12 cm., 1-2 grammes for pots 14-16 cm., or 4 grammes for pots 20 cm. in diameter. These figures represent about $7\frac{1}{2}$ grains for pots under $4\frac{1}{2}$ inches, 15-30 grains for pots under $6\frac{1}{2}$ inches, and about 60 grains for 8 inch pots.

THE CORN MARKETS IN MARCH.

C. KAINS-JACKSON.

Retail demand for breadstuffs freshened during March, and for the month as a whole exceeded the average. The tone of the markets quickly improved under the influence of many small orders coming in; nothing, in fact, puts more heart into the wholesale trade than the feeling that there is a wide basis for it in the good state of the retail inquiry. Feeding stuffs were a good sale, owing to the backward state of the pastures and the increased reluctance felt by farmers for any exclusive reliance on roots as feed in winter. This is a case of scientific instruction and good farming reacting on the markets, and may fairly be taken as a hopeful sign in our agriculture.

Wheat.—The price of English wheat for March, 1909, which works out at an average higher than for any preceding March during the new century, may be regarded as a legitimate encouragement to farmers. If spring sowing of wheat had any extensive vogue in England, the average of 36s. for the last week of March would not have come too late to lead to an increase in the area sown. English farmers, however, are very conservative in this respect, and the idea that spring wheat gives a poor yield to the acre is very deep-rooted. At the end of March no foreign wheat was on sale for less than 40s. per 480 lb., which was the lowest quotation at Mark Lane on the 31st, albeit the receipts of the previous fifteen days from abroad had been close upon a quarter of a million quarters. The closing prices for imported wheat were in London, per quarter, the best Manitoba, 44s.; Common No. 4 Manitoba, 40s. 6d.; Durum, 40s. 6d.; Argentine, 40s. 6d.; Russian best grades, such as Saxonka, Kubanka, &c., 44s.; ordinary South Russian Azima, 42s. 6d.; Odessa Ghirka, 41s. 6d.; Australian, 41s.; Californian, 41s.; and Walla Walla, 40s. 6d.

The supply of foreign wheat on passage rose gradually during the month until, on the 31st, it stood at 4,215,000 qrs. This is the highest total ever registered on that particular date, but on March 31st, 1908, the figure was 4,189,000 qrs., and on February 29th, 1908, it was 4,285,000 qrs. The Argentine shipments are falling off, and the greater part of the Australian surplus is usually exported in the first three months of the year. A gradual reduction in the supply on passage is therefore now to be anticipated. In the course of April,

1908, supplies on passage fell off by 900,000 qrs. The shipments of March were 484,000 qrs. from North America, 2,905,000 qrs. from South America, 642,000 qrs. from Russia, 115,000 qrs. from Roumania and Bulgaria, and 700,000 qrs. from the Australasian Colonies. The shipments from North America were less than usual, and even these were not made at a profit in every case, prices in the United States showing an appreciable rise. The month's sales of wheat, both English and foreign, were above the average.

Flour.—When bakers advance the price of bread by a halfpenny on the quartern loaf they are able to pay 4s. per sack more money for their flour. Millers, however, seldom are in a position to put up flour prices to the full extent, because there has to be much give-and-take in their business, and bakers, operating by no smaller unit than the equivalent of 4s. per sack on flour, have usually been selling at a loss for a fortnight or three weeks before they can arrange for a uniform advance. Top-price flour is now at 36s., while Town Households are at 31s. per sack. Each type has risen 3s. since the beginning of the cereal year. Country flour has risen from 26s. in mid-February to 28s. at the end of March, Iron Duke from 26s. to 27s. 6d., and common American bakers' grades from 25s. 6d. to 27s. Hungarian flour at 44s. to 45s. is held above the ideas of buyers. North America in March shipped only 324,000 sks., and there are only 180,000 sks. on passage. April and May supplies of foreign flour were, therefore, at the end of March, expected to be very decidedly below the average.

Barley.—The supply of English barley since harvest has never been equal to the requirements, and prices have consequently moved slowly but surely in an upward direction. In the thirty completed weeks of the cereal year the advance was 9d., for the last of the thirty weeks it was 2s. 2d. per qr. The crop of 1908 was appreciably smaller than that of 1907. Imports for the same thirty completed weeks have been 4,149,000 qrs. (in round numbers) against 3,879,000 qrs. last season, but the deficiency in home deliveries has been by no means made up by the increased supply of foreign, apart from the important fact that, whereas the deficiency has been in 416 lb. to 448 lb. sorts, the increase has been limited to cheap and light 400 lb barley, most of it from Russia. Shipments for March were 555,000 qrs. from Russia, as compared with 60,000 qrs. from North and South America, and 127,000 qrs. from all old-world sources, except Russia itself. The prices now ruling for barley show that we cannot quite equal Central Europe for the very highest quality. Bohemian and Austrian barley makes 42s. per 448 lb., whereas no English exceeds 40s., and few samples exceed 36s. per qr. The price of light barley from Russia is stationary at 22s. to 22s. 6d. per 400 lb.

Oats.—When English oats averaged between 17s. and 17s. 6d. only, it was said that at such a price it paid better to use them on the farm. But at the end of March, 18s. 6d. was averaged, and yet the supplies were 15 to 20 per cent. smaller than at the like period of 1908. The increased consumption of oats on the farm probably cannot be separated from a consideration of the maize trade. When the price of oats is high and that of maize low, many farmers are tempted to a double transaction in selling the former and buying the latter. It must be remembered that a single market visit amply

suffices for both transactions. Imports of oats to the end of March, though about 434,000 qrs. more than last season, were still below the mean. Argentina, however, shipped, in the course of March, 621,000 qrs., and the quantity on passage is now greatly above the average, though, in type, limited to 304 lb.—that is to say, to the least appreciated kind. Present values for oats are about a guinea per 336 lb. for good, named varieties of English; 19s. per 320 lb., Königsberg; 16s. per 304 lb. for Argentine; and 16s. 3d. to 16s. 6d. for 304 lb. Russian. A very small supply of 384 lb. New Zealand is held at 24s. per qr.

Maize.—The imports of Indian corn for the seven completed months of the cereal year were a little under five million qrs., whereas in the like period of the last cereal year, they were a little above six million qrs. The presumption that this difference has been made up by increased use of oats on the farm would explain the peculiarities already discussed in relation to that trade, but it cannot be claimed that it is more than a surmise. The March shipments of maize were 403,000 qrs. from North America, 286,000 qrs. from Russia, and 257,000 qrs. from Roumania, Bulgaria, and Salonica. The quantity on passage on 31st March was only 310,000 qrs., which is much below the average. Argentina reports a good crop ripe for harvest, but it will require, as does all maize, a drying period of two months between harvest and shipment, and it will not reach England in any very large quantity before early August, for which date it is offered at 5s. 4d. per cental, spot values of most sorts of maize being 5s. 9d. to 5s. 10d. per cental. At Mark Lane 27s. 6d. is paid for 480 lb. of round, and 28s. 6d. for the like weight of flat corn. The fine maize of Natal and Rhodesia is in better demand than supply; a price of 30s. to 30s. 6d. may be quoted.

Pulse.—Egypt, Syria, and Anatolia are disappointing British buyers of beans, who are accordingly free purchasers of good English at 36s. per 512 lb., and of New Zealand at 33s. per 504 lb. Lighter beans from China fetch 31s. 6d. per 480 bushels; Soy beans from Japan are quoted at six guineas per ton, a price equal to 27s. per 480 lb. The price of lentils is unchanged, and peas also are at former terms.

Oil Seeds.—Cotton seed has, during part of March, been obtainable at £7 10s. per ton for best Egyptian, a price that soon brings in buyers from different quarters. The Argentine shipments of linseed were not so heavy as in February, but there has been a certain amount of difficulty about effecting sales, many buyers preferring to wait for competitive offers of Indian new crop. The price of linseed may be said to range from 42s. to 46s. for the leading sorts. Rapeseed is cheaper on the month, owing to the excellent out-turn in at least some of the chief producing districts of India.

Farm Seeds.—Prices made for clover seed have not encouraged spring sowing. The terms ruling for English at the end of March were 62s. to 64s. for best, 44s. to 48s. for good, and 32s. to 36s. for common red, and were 30s. to 35s. lower on the year. The price of white was 48s. to 58s., and of suckling clover, 50s. to 52s. per cental. The price of Alsike, though a species of clover, is much better; 76s. to 88s. is the range, and four pounds per cwt. is about a mean value. High prices rule for Provence Lucerne: 76s. to 77s. per cwt. Perennial

ryegrass sells steadily at a guinea per cwt. Trefoil seed makes 30s. for best English, 27s. or thereabouts commanding excellent foreign. Good turnip seed has been fetching 30s. to 32s. per bushel, both for yellow-fleshed and white-fleshed. Special prize-winning mangolds of 1908 command 100s. per cwt. for the seed, but the ordinary good selected seed of customary use comes at 60s. to 70s. per cwt.

Minor Staples.—Although this term is of obvious utility it must not be construed with an excess of accuracy. Rice is an enormous trade; it is a minor staple here only because the corn market uses of it, mainly for mixing, are not very large. It commands 6s. 9d. per cwt. for the Bassein cargoes of feeding rice, chiefly noted in the Corn Trade. Beet sugar is similarly a far larger interest than would be indicated by the sales for food to live stock, even when proprietary articles in which it is incorporated are considered. At the end of March it was making 10s. 6d. per cwt. Barley meal at 7s. per cwt.; Dried ale grains at 5s. 6d. per cwt.; locust beans at 5s. 6d. per cwt., or kibbled, at 6s. per cwt. all had an appreciable sale; nor can we overlook the business done in maize gluten feed at £6 10s. per ton; in rice meal at £4 15s. per ton; in oat hulls at £2 6s. 3d. per ton; in decorticated cotton seed meal at 7s. per cwt.; in market poultry mixtures at 7s. to 7s. 3d. per cwt.; in middlings at 5s. 6d. to 7s. 6d. per cwt.; and in feeding flour at 21s. to 22s. per sk. Business in minor staples amounts in the aggregate to an item which is very material. Decidedly good bargains are from time to time to be picked up in this branch of the trade, the total volume of transactions in which is almost certainly well upon the increase.

THE LIVE AND DEAD MEAT TRADE IN MARCH.

A. T. MATTHEWS.

Fat Cattle.—The month opened with markets for cattle showing little change, though, on the whole, there was perhaps a weakening tendency. On the first day there were smaller supplies at Islington, and though buyers attempted to force down prices and thus made business very slow, they were not any lower at the finish. No less than twelve country markets were reported weaker during the week, but only at Basingstoke, Leeds, Norwich, Darlington, and York were any actual reductions made in the quotations for first quality Shorthorns, while an advance was recorded at Ashford and Peterborough. The highest quotation was 8s. 9d. per 14 lb. stone for this class of cattle at Ashford (Kent), Hull being again the lowest at 7s. 6d., but 8s. 2d. was a very general top price. The second Monday's market at Islington was very poorly supplied as regards numbers, there being only 790 on offer, and buyers being numerous, there was unusually keen competition. Prices advanced fully $\frac{1}{2}$ d. per lb., and the market was cleared quite two hours earlier than usual. Shorthorns easily realised 7 $\frac{1}{2}$ d. per lb. for the best and 7 $\frac{1}{4}$ d. for second quality. A better trade followed in the country, and more money was realised at Dorchester, Leicester, and Darlington, while Lincoln, Wolver-

hampton and York were lower. At six markets $7\frac{1}{2}d.$ per lb. was obtained for Shorthorns, and the average values would probably have been higher had it not been that in many markets there was a large supply of cattle in unfinished condition, owing, it was said, to the shortness of roots.

In the third week the decreasing proportion of prime, well-finished cattle was more perceptible, the supply of stall-feds falling short in many places. This was not the case at Islington on the 15th, where the show of polled Shorthorns from the eastern counties was well up to the usual mark. On that day nearly 1,200 cattle were exposed, and the general quality was excellent. So well-finished are most of these Norfolk cattle that many of them, when slaughtered, show a very large increase when their live and dead weight are compared. It is certain that many animals which have cost the buyer 40s. per cwt. according to the weighbridge, have died so well that they have only cost him $7d.$ per lb., with the offal given in. It is well that readers should take note of the wide difference that exists in this respect between such animals as are now coming from the Norfolk yards and the grass-fed beasts seen at Islington in the summer and autumn. Then the majority show no increase at all, and the weighbridge results in 14 lb. stones live weight are just about equal to 8 lb. dead. This fully accounts for the very low quotations at Islington Market for so many weeks last autumn, compared with others such as Ipswich, where there were continuous supplies of cattle liberally fed with concentrated foods.

The large supply on the 15th resulted in a decline of the top quotation to $7\frac{1}{2}d.$ per lb., but the average trade of the country showed little alteration. An advance of about $\frac{1}{2}d.$ per lb. took place at Ipswich, Lincoln, and Shrewsbury in the third week, but Hull, Leicester, Norwich, Nottingham, and Peterborough showed a corresponding decline.

As the end of the month approached, in spite of supplies remaining much the same and the maintenance of fair average quality, a weakening in the demand became distinctly visible, and though reductions in value were far from serious, the balance of the last whole week was against sellers. Taking twenty-one English markets which officially reported the value of first quality Shorthorns, the average price worked out at 8s. $0\frac{1}{2}d.$ per 14 lb. stone, against 8s. $1\frac{1}{2}d.$ for twenty-four markets in the previous week. The highest price of the week was 8s. $5d.$ at Ashford and Dorchester, and the lowest 7s. $6d.$ at Hull.

The last market at Islington sounded a more cheerful note. There was a moderate supply of 980 head, and the quality was well maintained. The early morning brought a strong contingent of buyers from the Central market. Prices advanced, and the ground lost the previous week was easily recovered.

Fat Sheep.—The depression in the sheep trade has continued, and the hopes of farmers that the new year would witness an improvement have, so far, been disappointed. There is now no doubt whatever that the winter feeding season has been disastrous, and that current prices leave very little or no margin to cover the cost of food and labour.

The month began badly. Supplies of turnip-fed tegs became heavier as the roots were running short, and there was certainly no increase in the demand. Fourteen markets reported the trade as worse in the first week, but quotations were not actually lowered in more than five. These were Hereford, Newcastle, Peterborough, Salford, and York, at each of which first quality Downs receded $\frac{1}{4}$ d. per lb. Clipped sheep began to appear at a few markets, amongst which were Lincoln, Hull, and Wakefield. The prices of these were from 5d. to 6d. per lb. For Down tegs in the wool, only Derby, Dorchester, and Salford quoted as high as 8d. per lb., Basingstoke, Bristol, Leicester, and Wolverhampton $7\frac{1}{2}$ d., many others $7\frac{1}{4}$ d., which was the most frequent top price, while at Hereford and Norwich nothing exceeded 7d.

Fat lambs met a very quiet trade, the cold weather being much against the demand for them. Dorset Horns and their crosses, if of any size, were very unsaleable, but nice, small Downs from Hertfordshire made $10\frac{1}{2}$ d. per lb. at Islington.

Although the general trade in sheep could not be said to show much improvement, prices advanced to a small extent in several markets during the second week. London was again well supplied with a fine lot of Down tegs of various breeds, those showing the character of the Oxford Down largely predominating. Trade was very slow, and quotations could not be altered from those of the previous week, although a very few small choice Downs slightly exceeded the $7\frac{1}{4}$ d. per lb. recorded officially. A better trade was reported at no less than fourteen markets, but only Basingstoke, Dorchester, Leicester, Peterborough, and Wellington actually quoted any advance. On the whole, there was doubtless a better feeling in the trade, but, as with cattle, there were many sheep offered in low condition, and this helped to keep down prices generally. Clipped sheep fetched from $5\frac{1}{2}$ d. to $6\frac{1}{4}$ d. per lb.

A great effort was made in the London market on the 15th to obtain some advance, which was only partially successful, for, although about $\frac{1}{4}$ d. per lb. more money was realised for those sold, a very large number were left unsold. It may be worth mentioning here that when this happens on a Monday at Islington, the overplus is not, as might be expected, kept over till the Thursday, but is sent away to the nearest country markets, such as Romford, &c. During the days that followed, one or two country markets reported a slight rise, but the movements appeared to be spasmodic and local only.

Perhaps London market on the 22nd may be said to have been about the worst of the month, but the country trade of the fourth week was better, the average price of first quality Downs at nineteen of the leading markets working out at something like $\frac{1}{4}$ d. per lb. advance on the previous week. This tendency was emphasised at the last Islington market on the 29th, when, with about 1,000 less on offer, the market was cleared at quite $\frac{1}{4}$ d. per lb. advance, some butchers saying that their purchases had cost them 4s. per head more money.

There was a very fair demand for choice Down lambs at the end of the month, this quality selling at an average of about 11d. per lb.

Veal Calves—The demand has been steady throughout the month,

and with moderate supplies the average price of first quality at twenty-four markets was about 9d. per lb.

Fat Pigs.—The pig trade was firm throughout the month, and bacon pigs especially met with a good demand. Ten shillings per score was never complained of, even in the times when farm produce generally was far higher than it is at present, and that price has been equalled or exceeded at no less than ten leading markets during March.

Carcase Beef.—The trade for carcase beef has been steady on the whole, particularly for Scotch, English, and port-killed. The supplies of Scotch at the London central market have only been moderate, and prices have remained remarkably steady from week to week. Those of English have been about normal, while port-killed American deliveries have been below the average. On more than one occasion Deptford market was closed for want of supplies, and the price at Birkenhead has often been too high to leave a margin of profit in the London market. There has been very little difference in the value of this and English beef, and the best quality of each has been about 5½d. to 6d. per lb., while Scotch whole sides have fetched 6¼d. and short sides 6½d. In comparing these values it should always be borne in mind that it is rare to see any of the very finest English beef at Smithfield, just as it is to find prime Hampshire or Southdown teg mutton. There has been more fluctuation in the value of chilled beef, and the average of both North American and Argentine has been declining, and is now relatively low. The best Argentine hind quarters have been reduced to 4d. per lb. and fore quarters to 2½d., while the finest States hind quarters have fallen to 5½d., and fore quarters to 3½d. per lb.

The trade in frozen meat has been extremely dull. It is curious to notice that the quotations for this beef all through the month have been the same for New Zealand, Australian, and Argentine, which is most unusual. The truth is that the business done has, at times, been almost nominal. The trade has been very bad, and there is no doubt that many sales have been made at lower figures than those officially acknowledged. The quotations given have been too near those of chilled to justify entire confidence in their being a true record of actual business. Between the values of beef imported dead and alive there is a very wide margin, and this suggests an inquiry as to the reason of the falling off in the supplies of the latter.

Carcase Mutton.—There was at times a slight rally in the price of mutton, and on one or two occasions an advance of ¼d. per lb. was established for the best qualities, notably of small Scotch tegs. This temporary improvement, however, was quickly followed by a relapse. The finest Scotch has rarely fetched more than 6¼d. per lb., and the best English on offer has touched 5¼d., while large numbers of West Country tegs have been forced off at 5d. per lb.

The carcase lamb trade has fluctuated very considerably. In the first week, choice "Wallingfords" fetched as much as 1s. per lb., but the following week the cold weather paralysed the trade, the demand was almost nil, and the same quality was quoted at 9d. Later

on the price rose to 10½d., but large, heavy lambs were scarcely more valuable than Scotch mutton.

Veal.—There has been a steady trade for veal throughout the month, but prices have been considerably lower in London than in the large provincial markets. The finest quality has been selling in London at 7½d. per lb., small Dutch calves sometimes fetching rather more.

Pork.—The demand for pork was by no means brisk, the low price of mutton having some effect on the trade. The best British ordinary-sized carcasses have averaged from 6d. to 6½d. per lb., but there is always a very limited supply of small "dairy-fed" porkers which fetch ½d. per lb. more. They are, however, too few to take into account when referring to the general trade.

THE PROVISION TRADE IN MARCH.

HEDLEY STEVENS.

Bacon.—The demand throughout March was again disappointingly slow, although it was slightly better than during the preceding month. In spite of this fact, however, prices have in some cases advanced, chiefly in consequence of smaller arrivals from the United States and Canada.

The writer has recently returned from a visit to the principal hog-packing centres in both the United States and Canada, and from information gathered and personal observation, he is of opinion that the supplies will show a still larger falling off during the next few months. Of recent years the American public have been taught to consume more hog products; and at the present time, with beef and mutton commanding high prices in that country, the consumption has been still further increased, which naturally reduces the surplus for export. Moreover, taking into consideration the freight charges to England, packers are realising 4s. to 6s. per cwt. over the prices that can be obtained on the British markets. During March, 1908, prices of hogs ranged from \$4.20 to \$4.90, until the last week of the month, when they jumped to \$5.70 and \$6.10. During March of the present year the range was from \$6.20 to \$7.15.

In Canada the difficulty in obtaining hogs, and the consequent high prices which breeders have been able to make, have had a very serious effect on the packing industry there, some houses have already closed down, while others are working half, and some even less, of their capacity, it being useless for them to continue sending goods to England, where the best prices obtained for some months past have been considerably below the cost of production. This is brought about chiefly by the keen competition of Danish.

This shortage of pigs in Canada is generally reported to be caused by the flourishing condition of the Canadian farmers. Cheese, butter, and corn have realised high prices for several seasons, consequently there is not the necessity to perform the unpleasant work necessary in connection with pig-rearing.

The conditions given above have brought about a good demand for English and Irish bacon, and in the western counties curers have paid 10s., and, in some cases, above this figure, for bacon pigs, against

9s. and under at the same time last year. The prospects for English breeders are for high prices for some time to come.

Cheese.—The month's trading has been disappointing, although an improvement has been shown on the demand experienced during the preceding month. The continued cold weather, more especially during the early part of the month, has doubtless affected the consumption, in addition to the high prices current, which have caused dealers to act very cautiously in making their purchases. On account of scarcity, coloured Canadians have realised 2s. to 4s. per cwt. more than white. Advices from Canada report that most of the stock held there for British account has now been shipped, and a fair demand from their home trade is clearing up all available lots.

The Canadian exporters report an unsatisfactory season's trade, from a profit standpoint; those who have paid expenses and come out without loss on the year's business consider themselves fortunate. The farmers have again had a prosperous time owing to a high range of prices throughout the season.

The estimated stocks of Canadian cheese at the three principal distributing centres (London, Liverpool, and Bristol) at the end of the month were 137,000 boxes, against 153,000 last year, and 205,000 two years ago.

The arrivals from New Zealand have been free, and from the beginning of the season show an increase over last year of about 20 per cent. The present stock in London is about 16,000 New Zealand cheeses more than twelve months ago.

There has been a fair trade in English makes throughout the month, with the stocks reported to be about the average.

Butter.—Dealers in this article have had to contend with dragging markets all the month. During the first few days the forecast of those best able to judge was for an increased demand, on account of the low prices prevailing, making butter proportionately cheap in comparison with all other dairy and hog products. Unfortunately for the wholesale trade the improvement in the demand and consequent rise in prices, which was looked for, has not taken place; in fact, the reverse has happened, as on some markets purchases could be made at the close of the month at from 4s. to 6s. per cwt. under the prices asked a week or two previously. This, of course, means serious losses to those who contracted early in the season for regular deliveries.

In Canada stocks of fancy creameries are in small compass, and are all wanted for the home trade, but they hold more summer makes than they require, and some parcels have been consigned, during the past month, to English houses for sale; but they come to a bad market, as best goods being obtainable at such low prices, the demand is very limited for the earlier makes.

Prices continue to rule very high in America, in fact, States butter is still being shipped back, and better returns have been made, even after paying the freight back to that country, than could have been obtained here.

Eggs.—The trade has been fairly satisfactory all the month. The cold weather, especially on the Continent, has curtailed the production, so that, with a steady demand and no accumulation of stock, prices have been maintained on an even basis.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and SCOTLAND
in the Month of March, 1909.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	ENGLAND.		SCOTLAND.	
	First Quality.	Second Quality.	First Quality.	Second Quality.
FAT STOCK:—	per stone.*	per stone.*	per cwt.†	per cwt.†
Cattle:—	s. d.	s. d.	s. d.	s. d.
Polled Scots	8 4	7 9	38 11	35 8
Herefords	8 4	7 7	—	—
Shorthorns	8 1	7 5	37 10	34 11
Devons	8 4	7 10	—	—
	per lb.*	per lb.*	per lb.*	per lb.*
	d.	d.	d.	d.
Veal Calves	8½	7½	8½	6½
Sheep:—				
Downs	7½	6½	—	—
Longwools	7	6½	—	—
Cheviots	7½	7½	7½	6½
Blackfaced	7½	6½	6½	5½
Cross-breds	7½	6½	7½	6½
	per stone.*	per stone.*	per stone.*	per stone.*
	s. d.	s. d.	s. d.	s. d.
Pigs:—				
Bacon Pigs	6 7	6 1	6 8	5 11
Porkers	7 2	6 8	7 2	6 5
LEAN STOCK:—	per head.	per head.	per head.	per head.
Milking Cows:—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk	20 14	17 12	22 5	17 10
„ —Calvers	19 18	17 2	20 17	17 0
Other Breeds—In Milk	16 10	14 14	18 12	15 8
„ —Calvers	14 10	13 0	19 8	15 15
Calves for Rearing	2 4	1 14	2 15	2 2
Store Cattle:—				
Shorthorns—Yearlings	10 5	8 12	9 11	7 18
„ —Two-year-olds	14 6	12 10	14 8	11 17
„ —Three-year-olds	17 4	15 3	16 17	14 15
Polled Scots—Two-year-olds	—	—	15 12	13 12
Herefords— „	15 7	14 4	—	—
Devons— „	14 7	13 5	—	—
Store Sheep:—				
Hoggs, Hoggets, Tegs, and Lambs—	s. d.	s. d.	s. d.	s. d.
Downs or Longwools	36 7	31 11	—	—
Scotch Cross-breds	—	—	26 5	22 11
Store Pigs:—				
Under 4 months	24 10	18 0	22 4	17 10

* Estimated carcase weight.

† Live weight.

AVERAGE PRICES of DEAD MEAT at certain MARKETS in
ENGLAND and SCOTLAND in the Month of March, 1909.

(Compiled from Reports received from the Board's Market
Reporters)

Description	Quality	London	Burn- ham	Man- chester	Liver- pool	Glas- gow	Edin- burgh
		per cwt	per cwt	per cwt	per cwt	per cwt	per cwt
		s d	s d	s d	s d	s d	s d
BEEF —							
English	1st	55 6	54 0	53 6	—	57 0*	54 6*
	2nd	53 0	49 0	49 6	—	52 6*	49 0*
Cow and Bull	1st	40 0	48 0	46 6	43 0	43 0	43 0
	2nd	34 6	41 6	42 0	37 6	37 6	37 6
U S A and Cana- dian —							
Port Killed	1st	56 6	53 6	52 6	54 0	51 6	—
	2nd	53 0	46 6	49 0	50 0	—	—
Argentine Frozen—							
Hind Quarters	1st	30 6	31 6	30 6	30 6	32 6	32 0
Fore "	1st	24 0	25 6	24 6	24 6	26 0	26 0
Argentine Chilled							
Hind Quarters	1st	41 0	43 0	40 0	40 0	43 0	42 6
Fore "	1st	29 0	30 6	30 6	29 6	32 0	31 6
American Chilled							
Hind Quarters—	1st	55 0	56 6	56 0	56 0	54 6	57 6
Fore "	1st	30 6	38 6	37 6	37 6	36 0	39 6
VEAL —							
British	1st	68 0	69 0	74 6	79 6	—	—
	2nd	63 6	56 0	66 6	74 6	—	—
Foreign	1st	69 6	—	60 6	60 6	—	64 6
MUTTON —							
Scotch	1st	55 6	60 6	65 6	66 0	59 0	51 6
	2nd	52 6	46 6	60 6	60 6	43 0	44 6
English	1st	52 0	60 6	60 6	60 6	—	—
	2nd	45 0	49 0	56 0	56 0	—	—
U S A and Cana- dian —							
Port killed	1st	—	—	—	—	—	—
Argentine Frozen	1st	29 6	27 6	27 6	27 6	23 6	30 0
Australian "	1st	25 0	26 0	25 0	25 0	—	—
New Zealand "	1st	33 0	—	—	—	—	—
LAMB —							
British	1st	99 0	95 6	102 6	—	—	—
	2nd	57 6	85 0	—	—	—	—
New Zealand	1st	51 6	50 6	48 6	48 6	55 0	56 0
Australian	1st	37 6	42 6	35 6	35 6	38 6	—
Argentine	1st	41 6	40 0	35 6	34 6	37 6	45 6
PORK —							
British	1st	57 6	62 0	62 0	62 6	56 6	58 6
	2nd	51 6	57 0	56 6	57 6	53 6	49 6
Foreign	1st	57 0	55 6	57 6	57 6	—	40 6

AVERAGE PRICES of **British Corn** per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1907, 1908 and 1909.

Weeks ended (1909)	WHEAT						BARLEY						OATS					
	1907	1908	1909	1907	1908	1909	1907	1908	1909	1907	1908	1909	1907	1908	1909	1907	1908	1909
	s	d	s	d	s	d	s	d	s	d	s	d	s	d	s	d	s	d
Jan 2	26	0	35	1	32	0	23	11	26	9	26	7	17	3	18	4	17	4
" 9	26	1	35	2	32	9	24	2	26	9	26	11	17	4	18	3	17	5
" 16	26	1	35	5	32	8	24	1	27	1	27	1	17	5	18	5	17	5
" 23	26	2	35	6	33	2	24	5	26	11	27	3	17	5	18	5	17	8
" 30	26	3	35	0	33	0	24	4	26	11	27	6	17	5	18	4	17	9
Feb 6	26	6	34	3	33	4	24	5	26	9	27	7	17	7	18	3	17	10
" 13	26	7	33	1	33	8	24	1	26	9	27	8	17	7	18	0	17	11
" 20	26	10	32	6	34	1	24	2	26	5	27	11	17	9	17	11	18	0
" 27	26	9	30	11	34	5	24	2	26	3	28	0	17	9	17	8	18	0
Mar 6	26	8	30	5	34	10	23	11	26	1	27	11	17	11	17	8	18	2
" 13	26	10	31	3	35	8	24	2	26	0	28	4	18	0	17	10	18	2
" 20	26	10	31	7	35	9	24	0	26	2	28	0	18	1	17	11	18	5
" 27	26	8	31	4	36	0	23	9	25	10	28	0	18	2	17	10	18	6
Apl 3	26	9	31	3	36	5	24	3	25	5	27	10	18	3	17	9	18	8
" 10	26	8	31	2	37	4	23	9	25	10	28	0	18	6	17	7	18	10
" 17	26	8	30	11			23	3	26	1			18	7	17	7		
" 24	26	10	30	10			23	3	25	5			18	9	17	9		
May 1	27	0	31	6			23	6	25	8			19	3	18	0		
" 8	27	6	32	4			24	0	25	5			19	7	18	4		
" 15	28	4	33	1			23	10	24	9			20	1	18	7		
" 22	29	7	33	8			24	3	25	9			20	5	18	10		
" 29	31	4	33	5			24	0	24	6			20	8	18	8		
June 5	32	0	33	1			24	7	25	10			20	7	18	4		
" 12	31	10	32	7			24	7	24	5			20	11	18	4		
" 19	31	4	32	0			24	11	24	2			20	9	18	5		
" 26	31	2	31	5			24	6	24	0			20	8	18	7		
July 3	31	3	30	11			24	8	23	11			20	11	18	7		
" 10	32	0	30	5			24	10	24	4			20	11	18	5		
" 17	32	6	30	7			24	6	23	1			21	1	18	5		
" 24	32	11	31	5			27	3	26	5			20	8	18	6		
" 31	33	2	31	10			26	4	24	4			21	2	18	7		
Aug 7	33	5	31	6			26	6	23	1			21	3	18	9		
" 14	33	6	31	6			25	9	23	10			20	4	18	1		
" 21	33	7	31	2			25	0	24	5			19	8	17	10		
" 28	33	10	30	10			24	6	24	5			18	11	17	1		
Sept 4	31	11	30	10			24	2	25	5			17	7	17	3		
" 11	31	4	31	5			24	4	25	11			17	6	17	6		
" 18	31	5	31	7			25	0	26	0			17	6	17	3		
" 25	31	8	31	5			25	3	26	8			17	8	17	2		
Oct 2	32	6	31	7			25	5	26	11			17	9	17	2		
" 9	33	3	31	5			25	9	27	5			17	11	17	0		
" 16	34	4	31	2			26	3	27	6			18	0	17	0		
" 23	35	9	30	11			27	2	27	5			18	7	16	11		
" 30	36	3	30	8			27	7	27	5			18	10	16	11		
Nov 6	35	10	30	11			27	8	27	6			18	10	17	0		
" 13	35	1	31	2			27	8	27	4			18	8	17	0		
" 20	34	7	31	10			27	5	27	4			18	9	17	3		
" 27	31	7	32	3			27	5	27	2			18	7	17	5		
Dec 4	34	7	32	7			27	1	27	2			18	6	17	4		
" 11	34	8	32	8			27	0	27	0			18	5	17	4		
" 18	34	9	32	9			27	1	26	9			18	3	17	3		
" 25	34	6	32	2			26	10	26	8			18	0	17	2		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lbs., Barley, 50 lbs.; Oats, 39 lbs. per Imperial Bushel.

AVERAGE PRICES of Wheat, Barley, and Oats per Imperial Quarter in FRANCE, BELGIUM, and GERMANY, and at PARIS, BERLIN, and Breslau.

		WHEAT.		BARLEY.		OATS.	
		1908.	1909.	1908.	1909.	1908.	1909.
		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
France :	February	39 3	38 8	25 11	26 2	20 3	20 4
	March	39 0	39 4	25 11	26 5	19 11	21 0
Paris :	February	39 4	39 8	26 2	23 3	19 8	20 11
	March	38 5	37 11	26 2	23 3	19 6	20 11
Belgium :	January	34 7	34 2	26 7	25 10	21 5	19 8
	February	34 5	36 0	26 4	26 1	20 10	19 10
Germany :	January	46 6	42 8	30 3	29 9	23 3	21 11
	February	44 9	44 9	29 6	29 6	22 8	22 6
Berlin :	January	47 4	44 11	—	—	23 9	23 3
	February	45 5	47 0	—	—	23 0	23 9
Breslau :	January	46 6	40 5	31 3 (brewing) 27 9 (other) 33 0 (brewing) 27 9 (other)	30 8 (brewing) 26 2 (other) 30 8 (brewing) 26 0 (other)	21 4	20 8
	February	44 7	42 1			20 11	21 4

NOTE.—The prices of grain in France have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*; the Belgian quotations are the official monthly averages published in the *Moniteur Belge*; the German quotations are taken from the *Deutscher Reichsanzeiger*, the prices for the German Empire representing the average of the prices at a number of markets.

AVERAGE PRICES of British Wheat, Barley, and Oats at certain Markets during the Month of March, 1908 and 1909.

		WHEAT.		BARLEY.		OATS.	
		1908.	1909.	1908.	1909.	1908.	1909.
		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
London ..	.	32 4	36 9	26 7	25 7	18 11	19 1
Norwich	.	31 6	35 5	26 6	27 9	17 11	18 1
Peterborough ..	.	30 10	35 1	24 9	26 6	17 6	18 0
Lincoln...		30 5	35 0	26 2	27 11	17 6	17 11
Doncaster	..	29 6	34 7	26 4	28 7	17 8	18 0
Salisbury	...	30 5	36 3	24 10	29 4	16 7	18 2

AVERAGE PRICES of PROVISIONS, POTATOES, and HAY at certain MARKETS in ENGLAND and SCOTLAND in the Month of March, 1909.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	London.		Bristol.		Liverpool.		Glasgow.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
BUTTER :—	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British ...	14 0	12 9	14 3	13 0	—	—	15 0	—
Irish Creamery	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
„ Factory	111 0	109 6	108 0	104 0	—	—	—	—
Danish ...	116 0	114 0	—	—	100 6	89 0	—	—
Russian ...	104 0	102 0	104 6	96 6	116 0	113 6	114 6	—
Canadian ...	—	—	103 6	99 6	104 0	99 0	104 0	94 6
Australian ...	103 6	101 0	107 6	101 0	103 6	100 6	—	—
New Zealand	106 6	104 6	110 6	105 6	105 6	101 6	107 6	103 6
					108 0	104 6	108 6	—
CHEESE :—								
British—								
Cheddar ...	77 6	69 0	74 0	62 6	76 0	71 0	72 0	65 0
Cheshire ...	120 lb.	120 lb.	—	—	120 lb.	120 lb.	—	—
Canadian ...	per cwt.	per cwt.	65 0	62 0	per cwt.	per cwt.	66 0	63 0
	65 0	63 0	—	—	66 0	61 6	—	—
BACON :—								
Irish ...	67 6	62 6	69 6	59 0	66 6	60 6	66 6	63 0
Canadian ...	60 6	—	59 6	57 0	58 0	55 6	60 6	58 6
HAMS :—								
Cumberland ...	100 0	90 0	—	—	—	—	—	—
Irish ...	96 6	86 0	—	—	—	—	88 0	76 0
American ...	—	—	—	—	—	—	—	—
(long cut) ...	51 0	49 0	49 6	47 0	50 6	47 0	52 0	50 0
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British ...	9 4	8 11	9 4	—	—	—	—	—
Irish ...	9 7	8 10	9 2	8 9	9 3	8 10	9 3	8 0
Danish ...	9 11	8 9	—	—	—	—	9 1	8 4
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Langworthy ...	70 0	60 0	66 0	60 0	80 0	71 6	48 6	43 6
Scottish								
Triumphs ...	60 0	50 0	60 0	53 6	40 0	35 0	—	—
Up-to-Date ...	60 0	50 0	60 0	53 6	40 0	35 0	37 0	32 6
HAY :—								
Clover	84 0	69 0	72 6	—	85 0	62 6	63 6	58 6
Meadow	71 0	55 6	65 0	—	—	—	55 0	50 0

DISEASES OF ANIMALS ACTS, 1894 to 1903.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

DISEASE.	MARCH.		THREE MONTHS ENDED MARCH.	
	1909.	1908.	1909	1908.
Swine-Fever :—				
Outbreaks	103	147	366	398
Swine Slaughtered as diseased or exposed to infection	1,149	855	3,209	1,906
Anthrax :—				
Outbreaks	106	96	359	321
Animals attacked	158	117	516	441
Foot-and-Mouth Disease :—				
Outbreaks	—	—	—	3
Animals attacked	—	—	—	112
Glanders (including Farcy) :—				
Outbreaks ...	52	71	153	213
Animals attacked ...	255	222	522	723
Sheep-Scab :—				
Outbreaks	59	93	372	571

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

DISEASE.	MARCH.		THREE MONTHS ENDED MARCH.	
	1909.	1908.	1909	1908.
Swine-Fever :—				
Outbreaks	3	11	8	40
Swine Slaughtered as diseased or exposed to infection	58	302	71	953
Anthrax :—				
Outbreaks ...	1	1	2	3
Animals attacked	1	4	2	6
Sheep-Scab :				
Outbreaks ...	62	29	227	221

SELECTED CONTENTS OF PERIODICALS.

Agriculture—

Farm Seeds Their Germination and Impurities, *W. Carruthers and H. T. Gussow*; Agricultural Education as recently reported upon, *Sir C. T. Dyke Acland*; The Training of the Young Farmer, *Drysdale Turner*; Interim Report of an Experiment for Ascertaining the Influence of Various Manures upon the Production of Mutton, *W. Ashcroft*; The Society's Experiments for the Improvement of Permanent Pastures, *E. A. Rawlence* (*Jour. Bath & West & S. C. Soc.*, 1908-9)

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Über Anbauversuche mit englischem Rotklee, *U. Spieckermann*; Über die Beeinflussung des Wachstums der Pflanzen durch deren Bespritzung oder Bestäubung mit giftigen oder düngenden Stoffen, *L. Hiltner* (*Prakt. Bl. Pflanzenbau u. Schutz*, Feb., 1909)

Beschleunigung des Wachstums der Gerste durch Elektrizität, *R. Lowenherz* (*Ztschr. Pflanzenkrankh.*, XVIII, 6)

Les produits agricoles français en Angleterre, *J. Périer*, La crise viticole en Italie, Mesures proposées pour l'envoyer (*Bul. Mens. Off. Renseig. Agr.* [Paris] Dec., 1908)

Contributions à l'étude du pouvoir absorbant et des dissolutions du sol, *E. Rousseaux et C. Brioux* (*Ann. Sci. Agron.*, 1908, 3 Fasc.)

Insects and Fungi—

Einige Versuche, das Winterstadium des amerikanischen Stachelbeermehltaus mit Fungiciden zu töten, *Jakob Eriksson*, Allerlei über die Verwendung des Karbolineums als Pflanzenschutzmittel, *I. Hiltner* (*Prakt. Bl. Pflanzenbau u. Schutz*, Jan., 1909)

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Welsh Cobs and Mountain Ponies, *Sir Walter Gilbey*; Horses for Military Purposes, *Lord Wynford*; Investigations relative to the Composition of Milk, *J. H. Burton and L. Abrams*; The Society's Experiments in Soft Cheese Making, *E. Matthews* (*Jour. Bath and West and S. C. Soc.*, 1908-9)

The milking machine as a factor in milk hygiene, *E. G. Hastings and C. Hoffman* (*Centbl. Bakt.*, &c., XXII., 7-10)

Birds, Bees and Poultry—

Le commerce des œufs en Danemark, Statuts de la Société coopérative danoise pour l'exportation (*Bul. Mens. Off. Renseig. Agr.* [Paris], Dec., 1908).

Forestry—

Waldkultur und Wasserpflanze im Harze, *Kgl. Forstmeister Kants* (*Ztschr. Forst u. Jagdw.*, 41, 3).

Die Normalertragstafeln im Dienste der Forsteinrichtung, *E. Ostwald*; Dichte oder weitständige Kulturen, *Kgl. Forstmeister Dittmar* (*Ztschr. Forst u. Jagdw.*, 41, 1).

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L'Union suisse des Paysans (*Bul. Mens. Off. Renseig. Agr.* [Paris], Dec., 1908).

The Value of Agricultural Organisation, *R. J. Peake* (*Jour. Bath & West & S. C. Soc.*, 1908-9).

Das landwirtschaftliche Genossenschaftswesen in Preussen, *W. Wygodzinski*; Verwaltung der landwirtschaftlichen Angelegenheiten, *C. Steinbrück*; Das Verkehrswesen, *C. Steinbrück*; Der Handel mit landwirtschaftlichen Erzeugnissen, *C. Steinbrück*; Die landlichen Arbeiter, *E. von Kahlen*; Das landwirtschaftliche Versicherungswesen:—Hagelversicherung, *Nobbe*, Viehversicherung, zu *Pultitz-Gross-Pankow*, Feuerversicherung, *A. Meitzen* (*Der Boden u. d. landw. Verhältnisse des Preussischen Staates*, 8 Band).

Engineering and Irrigation—

Dewponds, *G. Hubbard* (*Jour. Roy. Soc. Arts*, 5 Mar., 1909).

Agricultural Industries—

La séiculture en Hongrie, *de Fontenay*; Avenir du commerce de la margarine en Finlande (*Bul. Mens. Off. Renseig. Agr.* [Paris], Dec., 1908).

Landwirtschaftliche Nebengewerbe. Spiritusfabrikation, Kartoffelstarkefabrikation—Rubenzuckerfabrikation, *E. Struve* (*Der Boden u. d. landw. Verhältnisse d. Preussischen Staates*, 8 Band).

ADDITIONS TO THE LIBRARY.

[NOTE.—The receipt of annual publications of foreign agricultural and other departments, experiment stations and societies is not noted in the monthly list of additions to the Library, but a list of all such publications, which are regularly received, will be given from time to time.]

Agriculture—

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U.S. Department of Agriculture.—Farmers' Bulletins. No. 344 :—The Boll Weevil Problem, with special reference to means of reducing damage. (469 pp.) Washington, 1909.

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Kellner, O.—The Scientific Feeding of Animals. (404 pp.) London : Duckworth, 1909. 6s.

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Spargo, John.—The Commonsense of the Milk Question (351 pp) New York : Macmillan, 1908. 6s 6d. net

Slyke, L. L. van, and Publow, C. A.—The Science and Practice of Cheese-Making. (483 pp) New York : Orange Judd Co., 1909.

Lane, C. B.—The Business of Dairying. (234 pp.) New York : Orange Judd Co., 1909.

U.S. Department of Agriculture, Bureau of Animal Industry.—Circ. 130 :—Paraffin Butter Tubs (6 pp.) ; Circ. 136 :—How to Build a Stave Silo (18 pp.) ; Circ. 142 :—Some Important Factors in the Production of Sanitary Milk (20 pp.) ; Circ. 143 :—Milk and its Products as Carriers of Tuberculosis Infection (17 pp.). Washington, 1908-9.

U.S. Department of Agriculture.—Farmers' Bulletins. No. 346 :—The Computation of Rations for Farm Animals by the Use of Energy Values (32 pp.) ; No. 348 :—Bacteria in Milk (24 pp). Washington, 1908-9.

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Birds, Bees and Poultry—

U.S. Department of Agriculture, Bureau of Biological Survey.—Circ. 67 :—The Decision of the Supreme Court of the United States on the Sale of Imported Game. (12 pp.)

U.S. Department of Agriculture, Bureau of Entomology.—Bull. 75, Pt. iv. :—The Relation of the Etiology (Cause) of Bee Diseases to the Treatment (32-42 pp) ; Bull. 75, Pt. vi. :—The Status of Aviculture in the United States (58-80 pp).

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THE JOURNAL¹

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CHEESE-MAKING FOR SMALL HOLDERS.

JOHN BENSON.

MILK contains every chemical element required for the perfect nutrition of the human being, and in the form of cheese it can be preserved in a permanent and convenient form for consumption. Cheese contains the casein or nitrogenous part of the milk, together with the fat, while the sugar and part of the mineral matter escape in the whey.

Cheese, like all other products used for food, is made more attractive and saleable by putting it into convenient forms. The standard English cheeses, such as Cheddar, Cheshire, and Derby, are too large for the small-holder to make, as, usually, he will not have more than 7 to 10 gallons of milk daily, and only a portion of this will be available for cheese-making. In addition, the utensils required for the larger cheeses are expensive, and the process of manufacture difficult, hence it is evident that the small-holder must confine himself to cheeses which can be made from small quantities of milk by the use of cheap apparatus. Further, as the small-holder would not be able to employ skilled labour, the process must be simple and such as any intelligent person can understand. Usually, the demand for such small cheeses would be local, but, as the industry develops, there is no reason at all why a regular trade should not be done in them in our cities and large towns.

In developing a trade in small cheeses, description, size, and quality require to be standardised. The cheeses should

conform to particular types, and, if such cheeses were put upon the market regularly and in sufficient quantities, it seems reasonable to expect that a trade in them would spring up. In the past, soft and fancy cheeses made in England have not been a great success. No really serious attempt has been made to produce fancy cheeses of distinctive types, as will be clear to anyone who examines the collections of small cheeses at our dairy exhibitions. The types are usually nondescript, and represent a very poor attempt to follow the French in the matter of cheese-making.

In France—the home of the small-holder—the art of making small or cottage cheeses has been brought to a high state of perfection. Almost every district has its speciality, varying in consistence, flavour, and ability to keep, and these cheeses have not only a local reputation, but are also exported in considerable quantities. There is no English produce of this type to compare with the French Camembert cheeses, which are in such great demand in London and elsewhere, or with the small Dutch Edam, which is retailed in almost every grocers' establishment in the kingdom. The fact is that in the past we have been content to imitate the French and other foreign makers, and have imitated them badly, and, consequently, our make of fancy cheeses has to be sold in competition with the best foreign imported cheese of the same class, with disheartening results to our own makers.

It is proposed to describe here two varieties of small pressed cheeses which are ripened, and two soft varieties which are sold fresh, all of which are suitable for those who have a limited quantity of milk at their disposal. No attempt will be made to describe the manufacture of the more refined and delicate types of cheeses, such as Camembert, Brie, &c. To be of any value to the man possessing a small holding, it is necessary that the method of manufacture should be reasonably rapid and accurate, and should require no great amount of attention. In addition, if it is to be extensively adopted, it must be such as can be undertaken by the average small-holder or members of his family. Utensils which are inexpensive—both to purchase and to use—are necessary, and such utensils should be durable and easily cleaned.

As with all methods of dairying, it is essential that the milk intended for cheese-making should be perfectly clean and in good condition. It is of no use attempting to make good cheeses with dirty or carelessly handled milk, or milk kept under insanitary conditions. Good flavour in cheese ensures a ready market at remunerative prices; poor flavour condemns it, and no one wishes to buy it at any price.

Milk produced in almost any district will make good cheeses, provided always that the food given to the cows is sound and in good condition, and that the supply of water for drinking and cleansing purposes is pure.

Buildings and Utensils.—Almost any clean, airy, and well sheltered building having a good floor is suitable for cheese-making purposes, and if a cellar is available in which to ripen the pressed cheeses, so much the better. If a dairy has to be built, it should be of brick, with a cement floor falling to a channel, which leads to a suitable gulley placed outside the dairy and communicating with a proper drain. If pressed and ripened cheeses are to be made, then a similar building, to be used as a curing room, should be erected in line with the dairy, but sunk about 2 ft. in the ground, with a floor of cement, and well ventilated. The ripening-room need not be drained. A series of shelves should be put round the ripening-room on which to place the cheeses, and the walls of both rooms should be limewashed at least twice each year. When not required for cheese, the making-room would do duty as a butter dairy. A suitable size for the making-room is 10 ft. by 8 ft., and for the ripening-room, 8 ft. by 8 ft. The roof may be of tiles, thatch, or of galvanised sheeting lined underneath with boards. Perfect and ample ventilation in each room is necessary, and all ventilators and windows should be made to open and close at will, so that the rooms can be kept at a suitable temperature. In order to save expense both rooms may be made of wood placed on three or four courses of brick to prevent rotting. If built of wood, the outside walls would need to be double, with an air space between. The making-room should usually be kept at a temperature of 62° F. to 66° F., and the curing-room from 58° F. to 62° F.

The utensils necessary are a table 6 ft. long by 2½ ft. wide,

with raised sides and ends, and lined with tin sheeting. This table should slope to one corner, and be provided with an outlet and pipe to allow of proper drainage of the whey from the cheeses into a pail below. One or two well-made oak tubs in which to coagulate the milk are required. These tubs should be of a capacity of 6 gallons each, and be provided with close-fitting wooden lids. The maker will also need a large knife with which to cut the curd, milk-strainer, curd-ladle, skimming-dish, thermometer, cheese-moulds, boards, straw mats, measures, cheese-draining rack, set of shelves at one side of wall, measuring-glasses, pails, brushes, &c.; also weights up to 28 lb. with which to press cheeses Nos. 1 and 2, and a supply of rennet extract. The measuring-glass, 1-oz. size, should be sub-divided into drams. The straws for making the mats can be obtained from the straw-plait making districts, near Luton, in Bedfordshire, and should be of wheat straw. The other articles are obtainable from any well-known firm supplying dairy utensils. With the utensils described above, all the four varieties of cheeses described below can be made.

Pressed Cheese No. 1.—This is a cheese similar in type to the French Port-du-Salut, and not unlike the Welsh Caerphilly. It is a little firmer in texture than the former, and is more quickly made, and requires fewer utensils and accommodation than the latter. Five gallons of fresh sweet milk are required to make one cheese of standard size, and the cheese-moulds are strongly made of tin 10 in. wide by 4 in. deep, perforated at the sides, and provided with a close-fitting circular wooden disc or follower. The milk is first raised to a temperature of 92° F. to 95° F., and rennet in the proportion of 1 dram to each 2 gallons is used to bring about coagulation. The rennet is diluted with water, carefully mixed with the milk, and the contents of the tub stirred twice or thrice during the first four minutes. (It is well to remember at this stage that for all varieties of cheese it is necessary to dilute the rennet extract with about six times its volume of water before adding to the milk.) The tub is then covered with the wooden lid and left for 30 to 35 minutes, when coagulation should be complete. The curd—as the coagulated milk is called—is ready for cutting

when it feels firm and springy, and breaks with a clean fracture. A large knife, long enough to reach the bottom of the tub, is now taken, and the curd is carefully cut into $\frac{1}{2}$ -in. squares. When cutting is completed, the curd is gently broken up with a skimming dish, and reduced as far as possible into $\frac{1}{2}$ -in. cubes. Stirring by hand continues for from 10 to 15 minutes, and then the curd is allowed to settle. A cheese cloth is now thrown over the tub and pressed down to the curd, and a quantity of whey ladled off into a pail, and the temperature of this whey raised by immersion in hot water to such a degree that on the return of the whey to the cheese tub the whole of the contents will be raised to 98° F. or 100° F. This process is known as "scalding" or "cooking" the curd. (The term is a misnomer, but is one used by all cheese-makers.) In order to estimate the temperature to which that portion of the whey removed should be heated, it is first necessary to ascertain the quantity of the coagulated milk in the tub and its temperature. In this instance there are 5 gallons in the tub, and the ascertained temperature is, say, 90° F. It is required to raise the whole to 98° F.; therefore, each gallon of milk will have to be raised 8°. This, multiplied by 5—the total gallons of milk used—represents 40° of heat required. Two gallons of whey have been taken off, and the temperature is 90° F.; therefore, to obtain the necessary degree of heat in the whole contents of the tub, these two gallons must be heated to 110° F., or, if one gallon only had been taken off, the temperature would need to be raised to 130° F. It is not, however, advisable to raise the temperature of whey to a higher degree than, say, 120° F., or the cheeses will suffer in quality.

The rule for scalding is as follows: Multiply the number of gallons in the tub by the number of degrees of heat by which the milk has to be raised. Divide the number so obtained by the gallons of whey removed. The result added to the temperature of the whey when taken off will be the temperature to which the whey must be heated before returning to the cheese tub. When the curd has been scalded to 98° F. or 100° F., stirring by hand continues for 20 to 30 minutes, or till the curd becomes tough and bright in appearance and sinks rapidly. On pressing a little in the

hand, the particles should cohere and be a little springy. When this stage is reached, the curd is allowed to settle for 10 minutes, and the whey is then poured off through a straining-cloth. Should the temperature have fallen considerably during the process of stirring, it is well to bring the temperature up to the original before allowing the curd to settle. The curd is now ready for putting in the cheese hoop or mould. The hoop is placed on a draining-board 1 ft. square, and a cheese cloth placed inside, the curd being then lifted with the hands, breaking up meanwhile, and placed rapidly and evenly in the hoop. When filling is completed, the edges of the cloth are turned over, the wooden follower placed in position, and pressure applied at once by means of a 14-lb. weight, and this weight should be kept on for 15 minutes. The weight and follower are then removed, the edges of the cloth turned back, and the cheese turned by hand. Hoop, cloth, and follower are then replaced, and the cheese weighted up to 21 lb. In 30 minutes more the cheese is again turned, and weights up to 28 lb. placed upon it. It is then left under pressure for 4 hours, when the cloths and follower are removed, the edges of the cheese trimmed, and it is then left uncovered in the hoop.

Next morning salting takes place, and this is done by rubbing $1\frac{1}{2}$ oz. of salt carefully all over the cheese, leaving a little extra salt on the upper surface. It is again turned and salted in the evening, and the following morning washed with strong brine, and then placed on the shelf in the making-room to dry. On the third day after making, it is taken to the curing-room or cellar and turned each day till ripe. Occasionally, it is rubbed with a little brine to keep the skin clean. At the end of 3 weeks the cheese will be ready for use, but it will improve in quality if kept for six weeks. When ripe the cheese will weigh about $5\frac{1}{2}$ lb., and should realise 8d. or 9d. per lb.

If during ripening the cheese ferments and gets out of shape, then either the milk has been tainted, or the curd insufficiently scalded. On the other hand, if the cheese has a tendency to get hard and brittle, or the surface cracks, then the milk has been a little sour, or the process of filling into the hoops too long delayed.

Should a smaller cheese be required, hoops of a less diameter should be used, as, if the cheeses are to ripen properly, they must be at least $1\frac{3}{4}$ -in. thick.

Pressed Cheese No. 2.—This is a cheese made from mixed evening's and morning's milk, but the mixed milk should be fairly sweet. Five gallons will on an average make two cheeses of $2\frac{1}{2}$ to 3 lb. each in weight. This cheese partakes somewhat of the flavour and texture of a Cheshire, but very little acidity is allowed to develop in the curd. The temperature of the milk is first raised to 90° F. or 92° F., and rennet added in sufficient quantity to bring about perfect coagulation in 40 minutes. The amount of rennet necessary to be added will be about 1 dram to each $2\frac{1}{2}$ gallons of milk. After stirring in the rennet for 3 or 4 minutes, the cheese tub is covered, and, when coagulation is complete, the curd is cut into squares about $\frac{3}{4}$ in. in size, and these squares are then cut diagonally across. In this state the curd is allowed to remain covered up for 15 minutes. The method of dealing with the curd from this point is as follows:—A perforated skimming-dish is used to ladle out the curd which should be in slices $\frac{1}{2}$ in. deep. The curd is placed in a coarse cheese cloth laid over a wooden frame with a loose draining-rack beneath. The forms are about 2 ft. long by 18 in. wide, and 4 in. in height, and the whey escapes freely through the rack placed beneath. The curd should be ladled out quickly, and the temperature kept up as much as possible. When all the curd is in the form, the edges of the cloth are brought over, and the whole covered with dry cheese cloths. Open out the curd occasionally, and scrape the cloth with a blunt knife, spreading the curd to the full extent of the rack. It is important that the whey be drained away quickly, or the resulting cheese will be too soft. When the curd has drained to such an extent that there are 2 lb. of curd to each gallon of milk originally used, it is in a fit state for putting in the hoops. Place the curd in the hoops with the hands, and press firmly at the bottom and round the sides, and finish off the top smoothly. In moulding these cheeses, the hoop should stand on a piece of coarse cheese cloth. This assists in forming a good surface, but otherwise the hoops are not lined. As the curd is filled in, it should be carefully broken up, but not too finely, or drainage will be retarded.

When the hoops are filled, the cheeses are at once turned by inverting the cheese and the hoop at one operation. The cheeses should be kept warm and turned occasionally for the first hour. At this point the cheeses are pressed first with a 7-lb. weight, and later with a 14-lb. weight. The weights remain on the cheeses till evening. They are then removed, and the cheese is allowed to remain in the hoop overnight to develop acidity. In the morning the hoops are removed, and the cheese carefully salted. A rather thick layer of salt is desirable, and the upper surface should be more heavily salted than the rest. In the evening the cheeses are again turned and salted, and remain in the hoops for another 12 hours. They are then placed in strong brine for 6 hours, and, when taken out, have a light muslin bandage pasted neatly round the sides. When dry on the surface, they are taken to the ripening-room, turned each day, and will ripen in about 3 weeks. If the cheeses are wanted for use quickly, the first salting should be delayed. The temperature of the cheese room should be kept up to 62° F. or 65° F. during the whole process of making.

The hoops for these cheeses are about 6 in. wide by 4 in. deep, and are provided with followers made of elm-wood.

In hot weather it is advisable to spread a teaspoonful of salt in the centre when the hoops are half filled. The cheeses should have a smooth, clean coat, and be free from cracks, or there will be trouble with the cheese fly. If the coats are rough on removal from the brine, they should be scraped smooth with a knife before the sides are bandaged. Cheeses of this variety are quickly and easily made, and sell readily at from 7d. to 9d. per lb.

Soft Cheeses.—The manufacture of soft, unripened cheeses should be confined chiefly to the Midland and Southern districts of England, for in the North and in Scotland there is little or no demand for this class of cheese. Both of the cheeses described below are made from sweet whole milk, No. 1 being salted, while No. 2 cheese of the Cambridge type is sold quite fresh. The latter cheese should be made only during the summer months. Speaking generally, there is little demand for soft, unripened cheeses during the winter months.

Soft Cheese No. 1.—This cheese is made somewhat after the style of the French Coulommier cheese, but is sold in an unripened state. It is circular in form, about $1\frac{1}{4}$ in. deep, and weighs a little over 1 lb. One gallon of milk will make two cheeses, and the milk should be fresh and sweet. The renneting temperature varies between 82° F. and 86° F., and is regulated according to the temperature of the dairy, being raised if the room is cold, and lowered if high. If the season is unusually cool, it is well to add a little sour milk or buttermilk before putting in the rennet, as this will assist in after-drainage, and also prevent the formation of gas holes in the cheese.

Add about $\frac{1}{2}$ dram of rennet diluted with water to each 2 gallons of milk, and stir occasionally during the first half-hour to keep down the cream. If the cream be allowed to rise, it will show in unsightly streaks when the cheese is cut. Overstirring must be avoided, or there will be great loss of fat during drainage, and the cheese will be hard and dry.

Cover up the tub carefully, and at the end of about 3 hours the curd should be ready to place in the moulds. These moulds are of tin, $5\frac{1}{2}$ in. wide, and about 5 in. deep, and made in 2 pieces. The lower half of the mould is about 3 in. in height. The moulds are placed in pairs on straw mats resting on draining-boards, the boards being 14 in. by 8 in., and of yellow pine $\frac{1}{2}$ in. in thickness. The curd at ladling should be distinctly firm, and the whey clearly visible on the surface; if ladled out at too soft a stage, the cheeses will not drain properly. The ladle is of tinned iron with a long handle, and about 4 in. across the bowl. The bowl should have a sharp cutting edge or the curd will be damaged and loss of fat ensue. The cheese-making room should be kept warm, and at the end of 3 or 4 hours the curd should have sunk into the lower half of the mould. When it reaches this stage the upper part of the mould or hoop is removed, a straw mat and board placed on the top of the moulds, and all are turned at one operation. The cheeses are salted when they will keep their shape on removal of the lower hoop. First rub a little salt on the upper surface and later turn and hold the cheese in the palm of the left hand and salt carefully all over, about 1 oz. of salt to each cheese being required. In two or

three days they will be ready for use, and they are then wrapped in grease-proof paper, placed in chip or cardboard boxes, and sold. These cheeses realise from 6d. to 8d. each, and are profitable to manufacture. Should the cheeses drain slowly in the hoops and become fermented afterwards, then either the temperature at renneting has been too low or the curd has not been sufficiently firm when ladled out. Tainted milk will also cause sponginess in the cheese, but this can usually be obviated by the addition of a little sour milk at renneting.

Soft Cheese No. 2.—This cheese is made from fresh whole milk, and is usually designated Cambridge cheese. It is an English variety, and is in demand during warm weather. It should not be made in large numbers at one time unless readily sold, as, being unsalted and delicate, it quickly deteriorates, becoming yellow and unsightly in appearance. Two cheeses can be made from a little more than six quarts of milk. The temperature at renneting should be from 92° to 95° F. Add $\frac{1}{2}$ dram of rennet to the quantity of milk mentioned, and keep the cheese tub carefully covered. It is advisable to use a smaller tub when making not more than four cheeses.

Stir in the rennet for 3 or 4 minutes, and when the curd is well set and firm, and the whey on the surface, take out the curd with a skimming dish and place in the moulds in thin slices, setting aside a portion of unbroken curd to form a smooth upper surface on the cheese. The moulds are in two pieces, the bottom one holding threaded straw mats, which prevent the curd escaping, while the upper one is pierced with draining holes. They are about $7\frac{1}{2}$ in. long by 5 in. wide and 6 in. deep, and should be made of elm wood.

Moulds made of tin should not be used, as in these the curd rapidly loses heat, and drainage is thereby retarded. With tin moulds the curd settles into a flat cake, but with wooden moulds the curd adheres to the sides, causing the cheese to settle in the middle first, thus producing a curl in the curd which adds greatly to the appearance of the cheese.

These cheeses are not turned at all, and are ready for sale when the wooden moulds can be removed without the cheeses losing shape, each cheese weighing well over a pound. They are consumed fresh, being sold along with the straw mat

upon which they have been drained, the mat keeping the cheese in shape.

A tough, leathery cheese is caused by too high a temperature or too quick drainage. On the other hand, if the cheeses are spongy or soft the temperature at renneting has probably not been high enough or the dairy has been too cold. The cheeses are sent to market in wooden boxes containing several trays, and a single layer of cheeses is placed on each tray. They will realise from 8d. to 10d. each cheese.

It is important that all soft and fancy cheeses be packed neatly and put on the market before they are fully ripe, as being perishable goods they soon deteriorate and become unsaleable.

CO-OPERATIVE BACON CURING.

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Bacon curing as an organised industry has only come into existence within the last half century. As far back, however, as 1705, we find that Edward Lisle, in his *Observations in Husbandry*, refers to the Wiltshire cure of bacon, though it was not until much later that a great expansion in the trade in the County of Wiltshire caused the name associated with this produce to become celebrated throughout the world. The bulk of the bacon which is used in the United Kingdom is still cured in what is known as the Wiltshire fashion, or in whole sides, and there are at the present day several very large factories in England in which it is the principal product. In at least one of these factories the number of pigs handled every week exceeds 2,000. Such a number is small, however, in comparison with the numbers handled in some of the packing houses of the United States, where it is no uncommon thing to slaughter between 5,000 and 6,000 pigs in one day. The treatment and quality of the meat, however, are much below the standard aimed at in the United Kingdom, and notwithstanding the immense supplies of bacon which reach our country from abroad, the high price of the home product is on this account maintained.

The early days of bacon curing in the middle of last century gave little promise that it would become a great

industry in the United Kingdom. The methods which were in use then were of the most primitive character, and consisted, for the most part, of simply burying the flitches or sides of bacon in dry salt or immersing them in a saturated solution of salt, the meat being allowed to remain there until the tissues became impregnated with salt. The process was, of course, a destructive one, and the product was not attractive to the palate. The farmers in those days were bacon curers in a rough-and-ready way, and the tradition lingers in Cumberland, Westmorland, and Yorkshire that the best bacon is still obtainable on the farms amongst the hills. It is unquestionably a fact that, occasionally in Yorkshire, it is possible to find hams which are of quite a special flavour, and which cannot be imitated in modern curing cellars. But the practice of curing on the farm is gradually passing away and is being replaced by modern bacon factories, in which the business is organised and reduced to an exact science.

An early reference to bacon curing in Scotland will be found in Robert Henderson's "Treatise on the Breeding of Swine and the Curing of Bacon, with Hints on Agricultural Subjects," 1814, and it would appear from this account that the process of curing bacon was at that time carried on under great difficulties.

In Ireland it is said that a bacon factory was carried on at the town of New Ross in Co. Wexford for 200 years, and that large quantities of pickled pork were prepared there for the British Navy. Of curing bacon, however, as it is understood at the present day, there does not appear to have been any development in Ireland before the middle of last century. Factories then began to be formed, particularly in the province of Munster, and at the present day there are nine factories in that province, with a capacity of about 15,000 pigs per week.

In the whole of the United Kingdom, however, the number of bacon factories is probably not more than fifty, though there are naturally many hundreds of smaller curers, not only on the farms, but amongst pork purveyors.

Co-operation and Bacon Curing in Denmark.—The greatest impetus to the development of bacon curing was given in 1887, when Danish pigs were prohibited from

entering Germany. At that time there were a few bacon factories in Denmark, but none were carried on as co-operative organisations. When it became evident to the Danish farmers that their live swine which they had been, up to that time, sending to the German markets, would have to be utilised at home, they at once turned their attention to converting them into bacon, and started the first co-operative bacon factory at the town of Horsens. Since then co-operative bacon curing in Denmark has increased very largely, and in 1905 there were 30 co-operative bacon factories. There has also been a considerable development in the private factories, of which there were 24 in 1905, making the total number of factories in Denmark 54. This development was only possible because the Danish factories managed to suit the taste of the English bacon buyers, practically the whole of the bacon thus produced in Denmark being sent to the British markets. In 1908, the imports of bacon from Denmark amounted to 2,051,148 cwt., with a value of £5,685,526.

Bacon Curing Associations.—Co-operation was thus instrumental in causing a rapid development of the bacon industry in Denmark, but there has been no similar extension in this country, and it is only recently that British farmers have begun to consider the possibility of applying co-operation to the bacon industry in the United Kingdom. The first Farmers' Co-operative Bacon Factory was inaugurated at Roscrea, in Co. Tipperary, Ireland, in January, 1908, and it was able, under adverse circumstances, to show a successful record in its first year. The Roscrea Factory has a nominal capital of £15,000, of which rather less than £12,000 was subscribed, about £7,000 being absorbed for the site, buildings, and machinery. The initial expenditure on these items left a little over £4,000 for working capital. Experience showed that this was too little, and that the working capital of such a factory, having a capacity of about 750 pigs per week, should be at least £10,000. With a sufficient capital success may be assured, as by modern methods it is possible to realise high prices for home-cured bacon, and at the same time to utilise all the by-products which arise in such a factory.

Forming a Co-operative Society.—No better example of the methods necessary for the formation of a co-operative society could be given than the Roscrea bacon factory. The shareholders in this factory consist of some 2,800 members, the majority of whom are small farmers. At the commencement, when the subject of a co-operative bacon factory was discussed, a provisional committee was formed, and under its guidance the whole of the district was canvassed for support, and this support was freely given, so that the number of shareholders reached the large figure mentioned. The society was then registered under the Friendly Societies Acts, and shares were issued at £1 each. Subsequently the provisional committee elected a directorate, and they carry on the factory in much the same way as in the case of a joint stock company.

The principal difficulty in such a factory arises from the inability to guarantee a constant supply of pigs, and this was met by the subscribers being asked to sign a guarantee under a penalty, that they would supply all their pigs, of the weights required in the bacon trade, to the Roscrea Bacon Factory. This was intended to defeat any unfair attempt to induce farmers to sell their pigs at intentionally enhanced prices to other bacon factories. As a matter of fact, such attempts were really made, but it is to the credit of the Roscrea shareholders that they refused to accept any such offers.

In fixing upon a site for a bacon factory, it is well to bear in mind that it is usually in dairying districts that large numbers of pigs are available. The modern method of pig feeding has shown that a combination of separated milk and cereals is by far the best fattening material, and the future of the bacon curing industry is, therefore, to a large extent in the hands of dairy farmers.

The Breed of Pigs.—The first care is the breed of pigs. There are in the United Kingdom six well-known breeds which lend themselves to bacon curing. These are:—(1) Large White Yorkshire, (2) Middle White Yorkshire, (3) Berkshire, (4) Tamworth, (5) Large Black Suffolk, (6) Large Black Sussex; and, of these, the most useful for bacon curing purposes are the Yorkshire and Berkshire breeds.

For crossing purposes, however, the others are of considerable value, and it must be remembered that a pure breed of pigs is not wanted by the bacon curer. What he wants is the bacon pig, and this is an animal which does not belong to any particular breed.

A bacon pig should mature in about seven months, and it should turn the scale, "dead weight," at about 12 stone, or 168 lb. This size represents a live weight of from 15½ to 16 stone, and may generally be regarded as fetching the highest price for bacon curing purposes. Smaller pigs which are used for various sections of the trade, such as the making of hams and middles, may be in demand in certain localities, as heavier pigs may also be in demand; but on the average these will be wanted in small numbers.

The Construction of a Factory.—When a co-operative society has been formed, the first business will be to arrange for the construction of the bacon factory, and it will be found that, in comparison with the older factories, it is possible to construct a modern building very much more cheaply than was at one time the case. It was considered essential in the early days of bacon curing that there should be strong, thick walls around the factory. This notion, however, has been abandoned, and factories built for the most part of corrugated iron are likely to be more common than any other type in the future. In such a factory the construction can be so arranged as to lend itself easily to extension, if necessary, at any time. The main structure need not be expensive; corrugated iron is quite good enough for the roof and sides. In so far as the cellar, chill room, and engine room are concerned, these can advantageously be constructed of concrete walls, with hollow spaces, or built with concrete bricks or slabs with hollow centres.

The general arrangement throughout is that, as far as possible, one department follows the other in sequence, the object to be kept in view being to minimise the labour in connection with the cycle of operations.

It has been found that the best form of factory is such as would be contained within a rectangular space, and in two of the most modern factories, *i.e.*, at Roscrea in Tipperary, and Dunmow in Essex, this design has been followed

with the best possible results. Perhaps the best method of understanding the construction referred to will be to follow the operations through a modern factory.

Operations in a Modern Bacon Factory.—The pigs are landed on a receiving platform, where they are first of all weighed by the live weight, and suppliers can be paid on that weight at once, if they so desire. If, however, they prefer to receive payment on the "dead" weight, this is ascertained usually the day following that upon which the live pigs have been received. The dead weight averages about 25 per cent. less than the live weight.

After being weighed the pigs are driven into the sties, where they are allowed to remain overnight, and the slaughtering is usually carried out in the morning. They are driven, one by one, into the catching pen, where they are shackled, or caught up by means of leg chains, a running noose being formed by means of the chain being slipped through a ring, and the noose thus made is passed over one of the hind feet. This chain is then attached to a hook at the end of a steel rope, which is governed by a hand or power hoist. By this means the animals are hoisted to an overhead bar, and, when they are in position, are slaughtered, the blood being let out very quickly by the insertion of a knife in the direction of the heart. From the time of the live animals entering, to the moment the carcasses are suspended lifeless, is not more than one minute, so that in the modern factory this operation is very expeditious.

The carcasses are pushed along the overhead bar to the bleeding passage, and are allowed to hang there some little time, after which they are pushed off the bar on to a dumping table. This dumping table forms part of what is known as a "Slaughtering Tack," which is the main part of a pig abattoir. While on the dumping table the leg chains are removed, and the carcasses are then rolled into a rectangular scalding vat, capable of holding some five pigs at once. This vat is partially filled with water at a temperature of about 180° F., and the carcasses are turned round and round in this bath until the hair becomes loose. They are then, one by one, tilted on to a scuttling table, where they are scraped almost free from hair.

A hook is then inserted in the apex of the lower jaw, and the animals are suspended to a track bar, head upwards. They are pushed along this bar until they come under the opening of a vertical singeing furnace, which is so constructed that the carcass of the pig may be hoisted through a circular fire, and in this way the whole carcass is burned or singed. This operation takes only a quarter of a minute, and the burnt carcass is again lowered to the track bar, when it presents a very black and shrivelled appearance. This burning, however, is a great advantage for Wiltshire bacon, inasmuch as it imparts a particularly piquant flavour to the meat. The fact, also, that the fat underneath the skin is momentarily melted is also an advantage, as in subsequent operations it becomes firmer than it would otherwise be.

After leaving the singeing furnace the carcasses are thrown into a cold-water bath, and are cooled, after which the sinews of the hind feet are exposed and a gambrel inserted, so as to spread the hind feet apart.

By means of the gambrel the carcasses are then hoisted on to a track bar, and are scraped quite clean and washed. The intestinal and general offal is then removed and taken to a separate apartment, where the different portions are assorted for various uses.

The flake lard is always left with the carcass, and is weighed in together with the head and feet, so as to form the "dead weight," which is sometimes taken while the carcass is warm, and at other times is ascertained after the excess of animal heat has dissipated. When the carcass is weighed in the warm condition an allowance of four pounds is made for loss of weight in cooling. Cooling in the open air, so as to allow of the dissipation of the excess of animal heat, usually occupies about six hours. After removing the offal and weighing the carcasses, they are split up into sides. The head and forefeet are severed and the lard removed. It may be mentioned here that the head and feet are forthwith chilled and put into pickle to be cured.

The Curing Process.—The sides are pushed on into the hanging house, in case they have not already been allowed to hang, after which they are pushed along the track bar into the chill room, where they are kept at a temperature

of 38° F., until, on inserting a meat thermometer into the gammon end, it registers 40° F. On the average, it takes 36 hours to reach this degree of coolness, and when it has been attained the sides are taken into the curing cellar, where finally they are trimmed, and at once pumped with a recognised pickle in some fourteen different places, after which they are laid down on the cellar floor, and stacked in tiers 10 sides deep. The cellar is kept at a temperature of about 42° F.

Each side is covered over, first of all, with an equal mixture of curing antiseptic and saltpetre, in a finely granulated state, and on the top of this is placed a thick layer of salt. For mild-cured bacon this is all the curing that is required, and in about 14 days' time the process of curing is complete, after which the bacon is taken out and washed in cold water, and should then be in a state for selling as "green" bacon. If wanted as "dried" bacon, it must be hung in a drying room for three days in a temperature of 90° F., and is then available as "pale dried" bacon. If, however, it is wanted as "smoked" bacon, it must be hung for three days in a smoke stove where the temperature does not exceed 90° F., and where a thick volume of smoke is produced from hard wood sawdust, such as oak, ash, or beech.

These operations refer to what is technically known as "Wiltshire bacon," which is a commodity that is produced in all bacon curing countries. There are, however, many variations of the bacon curing trade, and also subsidiary operations, which in themselves are businesses, such as sausage making and lard refining. The products of a bacon factory may also include hams, middles, rolls of bacon, or other special products, but the processes of manufacture are only variations of the general principle of curing Wiltshire bacon. What is absolutely indispensable in the bacon factory is competent managership, and the employment of a staff who are acquainted with the various processes to be carried out.

Technical Education.—Bacon curing on a large scale is a highly technical business, but unfortunately no facilities exist for acquiring a knowledge of the technique of the business at any of our educational centres. This seems the

more remarkable when it is considered how important pig breeding and bacon curing are as an adjunct of dairy farming, and there can be little doubt that the absence of technical instruction results in an immense waste in by-products and in imperfectly manufactured articles, which would be avoided by men skilled in the science of the business. In other countries, notably in the United States of America, the packing houses have found that, by devoting attention to the by-products, they have opened up new and highly remunerative sources of revenue which were hardly thought of 25 years ago. The analytical chemist and the bacteriologist are considered essential in the economy of an American packing house of any pretensions. Hence these packing houses can, by bringing the best scientific knowledge to their assistance, place their main products in distant markets in other countries at a price below that of the home-produced articles.

It is not suggested that there should be a scientific staff in the comparatively small bacon factories of the United Kingdom, but it is none the less desirable that facilities for the technical instruction of managers should be provided at our colleges, so that men who propose to make a business of bacon curing may have opportunities of acquiring a knowledge of the technique of the subject. A bacon factory manager should be conversant with the breeding of pigs and the principles which govern their development for bacon purposes. He should also have some knowledge of their anatomical structure and of veterinary science relating to them. To this may be added a knowledge of the chemistry and bacteriology of meats, as well as of the curing processes, and of the uses to which the by-products in a bacon factory may be put. At the present day the by-products are practically wasted, and it is no exaggeration to say that if this department of the subject were better understood, it would add considerably to the profits of the bacon curing industry.

EGG-LAYING COMPETITIONS.

The laying powers of hens, like the milking capacities of cows, are largely a question of individuality and of strain, in which breed to some extent plays a minor part. The object of a laying competition is to determine the best individual hens or strain of hens with a view to their selection for reproductive purposes, and, incidentally, if carried out on a sufficiently extensive scale, it may afford valuable information as to the number of eggs laid at certain periods of the year, the comparative value of different breeds, sizes of eggs, and other points on which opinions differ. Competitions of this character, lasting for four winter months (October to February), were first begun by the Utility Poultry Club in 1897-8, and have since been continued annually. The comparatively short duration of these competitions, though extending over the period when egg production is most profitable, detracted to some extent from their value, and in 1907 it was decided to hold a competition extending over an entire year. No competition of this duration had previously been held in this country, and in view of the educational value of the results the Board of Agriculture and Fisheries made a grant of £35 towards the cost of the competition, which it was expected would result in a loss to the Club of £50.

The competition was carried out at Stocks Farm, Rayne, Braintree, under the management of Mr. E. W. Richardson, Hon. Secretary of the Utility Poultry Club, and lasted from October 1st, 1907, to September 30th, 1908. Twenty pens were provided, each pen consisting of six pullets of one breed hatched not earlier than January, 1907; they were housed separately, two grass runs (10 yards by 7 yards) to be used alternately, and a scratching shed (7 ft. by 4 ft.) being provided for each house (4 ft. by 4 ft.). Trap nests were used and a careful record of individual scores were kept.

Valuing the Eggs.—The award of the prizes was based on the total value of the eggs laid by each pen, the eggs being graded into two classes, those over two ounces being termed 1st grade, and valued at the average market price of the three leading egg markets in England, those weighing less than

two ounces being valued at 10 per cent. less. Extremely small eggs were regarded as unsaleable.

Feeding.—In feeding no attempt was made to obtain high egg averages by forcing, and only such food was given as an ordinary poultry keeper would be able to obtain. Three meals a day were given in the first seven months, afterwards only two. The morning feed consisted of biscuit meal, cloverine, granulated meat scalded and dried off with sharps, barley meal, and pea and bean meal, supplemented in winter by cabbage, swedes, turnips, and mangolds. In the evening wheat was generally used, and occasionally heavy white oats, and in very cold weather maize. Flint grit and oyster shell were always available.

Weather.—The weather was not unfavourable during the autumn and winter months, for though the temperature was occasionally low, no snow, except slight showers, fell till the last days of February, when heavy falls occurred for several days. This, apparently, upset the health of the birds, and three died within a week. In April extremely heavy falls occurred, followed by heavy rain in early May. It then became dry, and very little rain fell in June and July, and it was nearly the end of August before a considerable fall came. The hot, dry weather which prevailed caused premature moulting, and few eggs were produced in July and August. The showery weather of late August was continued into September and caused many of the birds to resume laying.

Broodiness.—This was most pronounced in the La Bresse and Partridge Wyandotte pens. A fair proportion of the White Wyandottes and Buff Rocks did not become broody, but five white Leghorns were broody nine times in all. The great variations in broodiness shown by the White Wyandottes and Buff Rocks are regarded as showing that by careful breeding excessive broodiness may be prevented.

Breeds.—There were eight pens of White Wyandottes, three of Buff Rocks, four of White Leghorns, and one each of La Bresse, Houdans, Barred Rocks, Black Wyandottes, and Partridge Wyandottes.

Results obtained from Individual Pens and Birds.—Only two pens laid 1,000 or more eggs, while two pens laid less

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Results obtained from Individual Pens and Birds.—Only two pens laid 1,000 or more eggs, while two pens laid less

than 600, the eggs being valued at £4 19s. 9d. and £4 18s. 4d. in the first case, and £3 1s. 7½d. and £2 4s. 1d. in the latter. Five birds laid 200 or more eggs, these being three Buff Rocks and two White Wyandottes with 216, 206, 203, 213, and 201 eggs respectively. The largest numbers of eggs laid by the other breeds were as follows:—White Leghorn, 158; Houdan, 140; La Bresse, 175; Barred Rock, 158; Black Wyandotte, 170; and Partridge Wyandotte, 132. The lowest individual totals were:—White Wyandotte, 87; Buff Rock, 54; White Leghorn, 36; Houdan, 99; La Bresse, 89; Barred Rock, 102; Black Wyandotte, 123; and Partridge Wyandotte, 69.

Comparison by Breeds.—As the number of fowls of the different breeds varied, in addition to being very small, no comparison by breeds can be regarded as of definite value. At the same time the difference between the three principal breeds is sufficiently marked to be of interest, as will be seen from the following table, though it does not follow that the figures are typical of the breeds as a whole:—

	White Wyandottes	White Leghorns	Buff Rocks.
Number of pens	8	4	3
Number of hens	48	24	18
Average number of saleable eggs per pen	884	703	814
Average number of saleable eggs per bird	147	117	136
Value of saleable eggs per pen	£4 6s 6d	£3 4s 2d	£3 18s 4d.
Value of saleable eggs per bird	14s 5d	10s 8d	13s 1d
Number of unsaleable eggs per pen	12½	—	2

The other five breeds, which were represented by only one pen each, gave the following results:—

	Number of Saleable Eggs		Value of Saleable Eggs.		Number of Unsaleable Eggs per Pen
	Per Pen	Per Bird.	Per Pen	Per Bird.	
Black Wyandottes	853	142	£ 5 17 9½	12 11½	2
La Bresse	735	122	3 12 8½	12 1	14
Barred Rocks	775	129	3 9 9	11 7½	29
Houdans	704	117	3 5 4½	10 10½	—
Partridge Wyandottes	513	85	2 4 1	7 4	36

As stated above, the yields from the La Bresse and Partridge Wyandotte pens were much affected by broodiness.

The results are a good deal affected by the poor results obtained from individual hens in some pens, together with the number of small eggs laid by some of the breeds. If the three best hens in each pen are selected the order of merit is a good deal changed. On this basis the number of saleable eggs laid by the different breeds is as follows:—White Wyandottes, average of 24 birds, 170 eggs; Buff Rocks, average of 9 birds, 161 eggs; White Leghorns, average of 12 birds, 136 eggs; Black Wyandottes, 156 eggs; Barred Rocks, 147 eggs; La Bresse, 143 eggs; Houdans, 134 eggs; and Partridge Wyandottes, 103 eggs (average of three birds in each case).

The great disparity in the performance of the birds in the same pen demonstrates the advantage of the trap nest, and the impossibility of building up a good laying strain without it. In the absence of trap nests, one bad layer in a pen may not be noticed, while there is every probability of the greater number of her eggs being laid in the breeding season, when the eggs are being reserved for incubation.

Average Number of Eggs Laid.—Leaving on one side the question of breed or strain and looking at the competition as a whole, it appears that the 120 birds laid 16,100 eggs in the 12 months, or an average of 134 eggs each. Of the total number 188 were below the standard size and were not valued. The market value of the saleable eggs was £75 13s. 8d., or an average of 12s. 8d. per bird.

An explanation of the low yields in certain cases may perhaps be found in the conditions as regards confinement, soil, lack of insect food, and other factors, which may have operated more unfavourably in some cases than others.

Monthly Averages.—The smallest number of eggs was laid in October and the largest number in April, but owing to the variation in price there was little difference in the average value of the produce taking each three months from October to June, but in July–September the yield, in addition to being small in number, fetched a lower price, so that this proved to be by far the least profitable period of the year.

The following table only includes the "saleable" eggs:—

Month.	Total Number of Eggs Produced.	Average Number per Bird.	Average Value per Bird.
October	455	3·8	s. d.
November	1,144	9·5	3 5
December	1,114	9·6	
January	1,204	10·0	
February	1,534	12·8	3 7½
March	1,919	16·0	
April	2,294	19·1	
May	2,114	17·6	3 4½
June	1,345	11·3	
July	1,167	9·7	
August	655	5·6	2 2½
September	967	8·0	
Total	15,912	133·0	12 7½

Winter Laying.—In connection with this question, it may be noted that the results obtained at four laying competitions, extending over 16 weeks from October to February, give an average production during that time from 412 birds of 31 eggs per bird. The yield, however, of the birds taking the first place at each of the twelve annual competitions of the Utility Poultry Club, gives an average of 53 eggs in the 16 weeks, while the highest figure recorded in any one year shows 69 eggs per bird in the same period. When it is remembered that the average of 31 eggs is based on the records of selected birds, it may fairly be assumed that the average yield obtained from the ordinary farmer's fowl is considerably less. On the other hand, the fact that the best strains are capable of producing 53 eggs or more at the most profitable time of the year, shows the extent to which by careful selection the laying powers of utility fowls may be developed.

At the twelfth winter laying competition, which lasted from October 21st, 1908, to February 9th, 1909, a period of 16 weeks, a non-competitive pen of four pullets laid 268 eggs, and three other pens laid as follows:—White Wyandottes, 250; White Leghorns, 210; Black Leghorns, 211. Out of 56 birds, 14, or 25, per cent., laid 60 eggs or over.

Even higher figures were recorded at a similar competition held by the Northern Utility Poultry Society at Burnley, Lancashire, where the four highest yields of pens of four pullets each were as follows:—(1) White Wyandottes, 278 eggs; (2) White Wyandottes, 256 eggs; (3) White Orpingtons, 217 eggs; and (4) Buff Orpingtons, 201 eggs. In this case, however, out of 100 birds only 13 laid over 60 eggs each during the four months. The total reached by the winning pen is the highest recorded in any of these competitions.

No deductions as to the value of the different varieties of poultry can, however, be drawn from these winter competitions, which are simply a method of awarding prizes to the best utility fowls. As the Committee of the Club observe, "the competitions are not given to determine which is the best breed; the Club recognises that good laying is a question of strain, and not of breed, and endeavours by means of these competitions to make known those fowls which, under a systematic treatment during the four worst months of the year, have proved themselves to be good layers."

THE AGRICULTURAL HOLDINGS ACT, 1908.

This Act (8 Edw. 7. Ch. 28), which came into operation on January 1st, 1909, is an Act "to consolidate the enactments relating to agricultural holdings in England and Wales." For that purpose it repeals and reproduces those enactments, which were contained in the Agricultural Holdings Acts of 1883, 1900, and 1906, the Tenants' Compensation Act, 1890, and the Market Gardeners' Compensation Act, 1895. But, although the new Act is a purely consolidating statute, the Board of Agriculture and Fisheries think it desirable to call attention to such of its provisions as reproduce those of the Agricultural Holdings Act, 1906, inasmuch as the date of the commencement of that Act was therein expressed to be the 1st day of January, 1909, so that its provisions came into operation for the first time under the new Act.

These provisions are embodied in the following sections of the Agricultural Holdings Act, 1908:—

Section 1. (1) Right of Tenant to Compensation for

Improvements.—This reproduces the corresponding Section of the Act of 1900, with the omission of the proviso as to “the inherent capabilities of the soil,” and to that extent alters the law.

Section 10. Compensation for Damage by Game.—Where the tenant has sustained damage to his crops from game, and the right to kill and take it is not vested in him nor in anyone claiming under him other than the landlord, and he has not permission to kill it, he is, subject to certain conditions, entitled to compensation from his landlord for such damage if it exceeds in amount one shilling per acre of the area over which the damage extends; and any agreement to the contrary, or in limitation of such compensation, is void. In default of agreement (made after the damage has been suffered) as to the amount of compensation, it is to be determined by arbitration.

The conditions referred to are that :—

(1) Notice in writing must be given to the landlord as soon as may be after the damage was first observed by the tenant.

(2) A reasonable opportunity must be given to the landlord to inspect the damage—(a) in the case of a growing crop, before the crop is begun to be reaped, raised, or consumed; and (b) in the case of a crop reaped or raised, before it is begun to be removed from the land; and

(3) Notice in writing of the claim, with the particulars thereof, must be given to the landlord within one month after the expiration of the calendar year, or such other period of twelve months as may be agreed, in respect of which the claim is made.

In the case of contracts of tenancy made before 1st January, 1909, it is provided that if compensation for damage by game is payable under the contract, or in fixing the rent under it, allowance in respect of such damage to an agreed amount was expressly made, the arbitrator shall make such deduction from the compensation as may appear just.

Where the right to kill and take the game is vested in some person other than the landlord, the landlord is entitled to be indemnified by that person against claims for compensation under the section.

The expression "game" is defined as meaning, in this section, deer, pheasants, partridges, grouse, and black game.

Section 11. Compensation for Unreasonable Disturbance.
—"Unreasonable disturbance" is where:—

(a) The landlord, without good and sufficient cause, and for reasons inconsistent with good estate management, terminates the tenancy by notice to quit, or having been requested in writing, at least one year before the expiration of the tenancy, to grant a renewal thereof, refuses to do so; or

(b) An increase of rent is demanded by reason of an increase in the value of the holding due to improvements executed by or at the cost of the tenant, for which he has not, directly or indirectly, received an equivalent from the landlord, and such demand results in the tenant quitting the holding.

In any case the tenant, upon quitting, is—notwithstanding any agreement to the contrary—entitled to compensation for the loss or expense, directly attributable to his quitting, which he may unavoidably incur upon or in connection with the sale or removal of his household goods or his implements of husbandry, produce or farm stock, on or used in connection with the holding.

But this is subject to the proviso that no such compensation shall be payable:—

(a) Unless the tenant has given to the landlord a reasonable opportunity of making a valuation of the goods, implements, produce and stock.

(b) Unless he has, within two months after the notice to quit or refusal to renew, given to the landlord notice in writing of his intention to claim compensation.

(c) Where the tenant with whom a contract of tenancy was made has died within three months before the date of the notice to quit or the refusal to renew;

(d) If the claim to compensation is not made within three months after the quitting.

Differences arising under this section are, in default of agreement, to be settled by arbitration.

Section 13 (1). Procedure in Arbitration.—This subsection applies to any question arising either under the Act

itself or under the contract of tenancy where the landlord and the tenant fail to settle it by agreement, and where such question is thereupon, under the provisions of the Act or of the contract of tenancy, referred to arbitration.

In that event the question is to be determined—notwithstanding any agreement, under the contract of tenancy or otherwise, providing for a different method of arbitration—by a single arbitrator, in accordance with the rules set out in the Second Schedule to the Act. These rules are the same as those set out in Part II. of the Second Schedule to the Act of 1900.

Section 26. Freedom of Cropping and Disposal of Produce.—Sub-section (1) gives to the tenant—notwithstanding any custom of the country or the provisions of any contract of tenancy or agreement respecting the method of cropping of arable lands—full right to practise any system of cropping of the arable land and to dispose of the produce of the holding; subject to the proviso that he shall previously have made, or as soon as may be shall make, suitable and adequate provision to protect the holding from injury or deterioration; which provision is, in the case of disposal of produce, to consist in the return to the holding of the full equivalent manorial value to the holding of crops sold off or removed in contravention of the custom, contract, or agreement. But this sub-section does not apply—(a) in the case of a tenancy from year to year, as respects the year before the tenant quits; or any period after he has given or received notice to quit which results in his quitting; or (b) in any other case, as respects the year before the expiration of the contract of tenancy.

If the tenant exercises his rights under this section in such a manner as to injure or deteriorate the holding, he is to be liable to pay damages or be restrained by injunction; and he is not entitled to compensation for improvements made by way of provision to protect the holding from injury or deterioration as required by the section.

“Arable land” does not include land in grass which by the contract of tenancy is to be retained in the same condition throughout the tenancy.

Section 27. Record of Holding.—If, at the commencement of a tenancy, either party so requires, a record of the

condition of the buildings, fences, gates, roads, drains, ditches and cultivation is to be made within three months after the commencement of the tenancy, by a person to be appointed in default of agreement by the Board of Agriculture and Fisheries; and, in default of agreement, the cost is to be borne by the landlord and the tenant in equal proportions.

Section 42. (2) Market Gardens.—Under this sub-section, with reference to tenancies current on 1st January, 1896, it is provided that the market garden improvements in respect of which compensation is payable under the section shall include improvements executed before as well as improvements executed after that date.

First Schedule, Part III. (27). Repairs to Buildings.—This adds to the list of improvements for which, though made without the landlord's consent, a quitting tenant is entitled to compensation, repairs to buildings, being buildings necessary for the proper cultivation or working of the holding, other than repairs which the tenant is under an obligation to execute; subject, however, to written notice to the landlord, with particulars, of the intention to execute the repairs and failure by the landlord to execute them within a reasonable time after such notice.

AMERICAN GOOSEBERRY MILDEW.

The disease known as American Gooseberry Mildew, *Sphaerotheca mors-uvae*, Berk., is of a very serious character. It has greatly increased the cost of the cultivation of gooseberries wherever it has appeared, and in some cases it has rendered gooseberry-growing impossible.

This fungus is much more injurious to gooseberry bushes than the allied European Gooseberry Mildew, *Microsphaera grossulariae*, Lev. (Leaflet No. 52), as it not only attacks the leaves, but also extends to the shoots and fruit, stunting the latter and rendering it unsaleable.*

In the following pages there are given (1) such a description of the fungus as will aid fruit-growers to recognise the disease should their gooseberry bushes be found to be attacked, (2) precautions to be observed by gooseberry growers, and (3) instructions for the treatment of infected bushes.

* Occasionally the English mildew assumes a virulent form and attacks the fruit.

Description of the Fungus.—There are two well-marked stages in the life of this fungus: in the first stage it is white (*See Journal*, May, 1907, Coloured Plate facing p. 104); in the second stage it is brown (*See Journal*, December, 1907, Coloured Plate facing p. 544). The white stage always comes first, but the brown is more easily seen and is often the first to attract attention. The white form of the mildew, usually called the summer stage, may appear at any time between May and November, while the brown stage, known as the winter stage, may be seen from July onwards. During the winter months the brown colour gradually changes to grey. While in the white stage the mildew produces vast numbers of minute spores. (The spores of fungi correspond to the seeds of higher plants.) These spores are carried about in various ways, and if they fall on the opening buds or young fruit of a gooseberry bush they begin to grow at once. In this way in warm and moist weather the mildew may spread very rapidly; but fortunately for fruit-growers it does not always spread rapidly. The summer spores, though numerous, are short-lived, and in cool, dry weather they seem to be incapable of doing much mischief.

If gooseberry mildew were to depend on the short-lived summer spores it could not exist throughout the winter; very soon, therefore, a second kind of spore begins to form. This spore is known as the winter or resting spore. The fungus is thus more difficult to check than an ordinary weed, which produces only one kind of seed, and the difficulty is increased by the character of the winter fruits inside of which the spores are found.

Before forming winter spores the mildew changes colour and assumes a deep brown tint, so that badly-affected twigs look as if they had been smeared with chocolate. If infested twigs are thereafter examined with a magnifying glass minute black dots called winter fruits will be seen. (The winter fruits are shown in Fig. 4 of the second Plate mentioned above.) Each winter fruit consists of a strong shell, inside which are eight spores. The shell protects the delicate spores throughout the winter, and does not open until spring growth begins. "From the course which the disease runs in this country, it would appear that the fruits begin to liberate

the resting spores early in May, but that the majority burst in June or July. Some winter fruits remain attached to the infected twigs throughout the winter, but the greater number fall off and lie in the soil.

Conditions under which Disease Occurs.—American Gooseberry Mildew attacks soft quick-growing shoots; thus suckers, and the shoots produced in warm, moist weather, are much more liable to infection than firm, slow-growing shoots. This explains a feature of the disease which often puzzles growers. When a new district is attacked, the first plantations to suffer are those which have been highly manured and carefully managed. The large, quick-growing bushes produced by such treatment are found to be much more liable to attack than the poor plants in a neglected garden.

Some varieties of gooseberry are naturally more vigorous than others, and thus produce more young wood in the late summer and autumn; these varieties are found to be most affected by mildew. For example, the quick-growing varieties "Keepsake," "White Lion," and "Crown Bob" contract disease to a greater extent than the slow-growing varieties "Whitesmith," "Careless," and "Long Swan." Apart from the rate of growth and the nature of the new shoots produced, varieties do not seem to have any special capacity for resisting disease. Thus "Golden Drop" is not so liable to attacks on the young wood as most other varieties, but the berries, which happen to have a soft skin, are more apt to suffer from mildew than those of any other kind. In most varieties disease does not appear to be able to attack the berries after they are half-grown, but in "Golden Drop" full-grown berries may suffer.

Deep, porous soils produce tall, vigorous plants, while shallow or stiff soils produce small bushes, so that disease is more troublesome on the former than on the latter class of soil. When, associated with deep, porous soils, there is an abundance of moisture, as in the silty soils of the Wisbech district, the conditions are specially favourable for the spread of mildew. In gardens in all affected districts variations in the depth of the soil, and in the amount of moisture, account for the unequal distribution of disease throughout infected plantations.

Precautions to be observed by Growers.—Although there are many affected gardens in certain districts, and although infection may doubtless be conveyed by wind, birds, insects, and other means which are outside a grower's control, it does not follow that it is useless to take precautions against infection. Even in Worcestershire, where the disease has longest been known to exist, by far the greater number of gardens are free, and of those infected a comparatively small number are badly attacked.

Again, as has already been stated, the disease does not always spread rapidly, and in many of the cases in which it has suddenly appeared all over a plantation there has been reason to suspect that the plantation had been affected for some time without attracting attention. On the other hand, in many of the cases in which the mildew has been discovered early and prompt action has been taken, disease has not spread throughout the plantation.

When the disease is neglected and allowed to spread all over a garden, the cost of treating it is heavy, and in many of the worst cases it pays the owner better to grub up the plantation than to attempt to cure the affected bushes. It is quite clear, therefore, that it is worth a fruit-grower's while to take precautions to prevent infection, and to prevent disease from spreading if his garden should unfortunately become infected.

Fruit-growers are recommended to observe the following precautions:—

(1) Plants should not be purchased from nurserymen or dealers unless a guarantee is given that they are free from American Gooseberry Mildew. Young shoots should be cut back before being planted and the prunings burned.

(2) So many cases have been found in which disease has begun on bushes close to the packing-sheds or other places near which "empties" have been stored, that baskets, barrels, sacks, &c., which may recently have been in a diseased garden should be treated with suspicion. Empties sent by salesmen for carrying fruit of any kind to market should not be taken direct into gooseberry plantations. They should first be disinfected. Baskets may be disinfected by dipping them in boiling water or in a solution of 1 lb. blue-

stone (copper sulphate) to 20 gallons of water; sacks may be scalded. Even if disinfected, packages should not be taken into fruit plantations until actually required. As already stated, the summer spores of mildew do not live long, and every day's delay in bringing baskets near gooseberry bushes makes the risk of infection less.

(3) Labourers who have been working in a garden in which the disease exists in its summer stage should not be set to work in a clean gooseberry plantation for a week at least unless means have been taken to disinfect their clothing.

(4) Growers should make a practice of searching their plantations for traces of disease at frequent intervals, especially in the months of July, August, and September. Young leaves which are attacked generally curl upwards and show a white under-surface covered with mildew. Pickers should be told to report at once any cases of mould on the berries. As indicated above, outbreaks of disease in plantations in which mildew has not previously appeared are very often found near packing-sheds, so that special care should be taken in examining bushes near the places where gooseberries, plums, &c., have been got ready for market.

(5) As disease may appear at any time between May and November, fruit-growers should keep on their premises a few pounds of liver of sulphur. This substance, when freshly made up, as explained below, is the best spraying material for summer use. A good quality should be procurable at 6d. per lb. It must be kept in an air-tight tin or a corked bottle, for if exposed to air it quickly loses its value. A spraying pump should also be kept in readiness. The ordinary knapsack sprayer costing about 35s. would serve for ordinary plantations, or a hand-pump of the syringe pattern costing 7s. 6d. to 15s. might be used in small gardens.

Treatment of a First Outbreak.—Assuming that a watchful fruit-grower discovers the disease as soon as it gets into his plantation, he should at once remove and destroy the affected berries or shoots; they may be collected in an iron bucket and burned, or dipped into a "steep" made by dissolving 1 lb. liver of sulphur or 1 lb. bluestone in 10 gallons of water. A spraying mixture should then be made up of 1 oz. liver of sulphur to 2 gallons of water, and the affected

bush and surrounding bushes should be thoroughly sprayed. Those who do not possess a spraying pump may use an ordinary syringe or a watering-can. After the spray has dried, the affected bushes should be dug up and burned, or the young wood should be removed. If many twigs or berries are covered with mildew when the disease is first observed, the bush should be sprayed before any attempt is made to remove the diseased material.

In treating American Gooseberry Mildew, the first essential for success is prompt action. Since the spread of the infection may be very rapid, it is recommended that where very little mildew is to be seen, it should be cut off and destroyed immediately. The shoots removed must not be carried through the plantation. They may be destroyed as indicated above, or buried below the bush from which they have been taken, and covered with several inches of soil; only twigs affected by the white stage should be thus covered up: the brown stage of the fungus must always be destroyed by burning, never buried in the soil. When many twigs have become diseased there is much danger of spreading the mildew while working among the bushes, and the bushes should therefore first be sprayed. The spray will destroy much of the mildew, and the risk run by working among the bushes will be greatly reduced.

On any bush upon which mildew has been seen, and also on the bushes in contact with the diseased plant, there will probably be a number of recently infected twigs, which will bear no visible traces of disease. Thorough spraying will do much good, but as it is very difficult to ensure that the spray wets every part of a bush, the safest plan is to remove and burn the infected and suspected bushes as soon as possible after the mildewed twigs have been destroyed as recommended above. If this is not done, the bushes must at least be very carefully pruned so as to remove all young wood that may be infected.

In the above recommendations it is assumed that spraying materials are at hand; should this not be the case, a bucket containing paraffin should be procured, and all diseased material should be removed, dipped in paraffin, and burned at once. It is better to risk the danger of spreading infection

by working among unsprayed bushes than to delay for a day the work of destroying diseased twigs.

It must be clearly understood, however, that the above advice refers to slight outbreaks affecting a few bushes which could be dealt with single-handed by a careful man. It would be most unsafe to turn a number of labourers into an affected plantation to root up and burn bushes suffering from disease in the summer stage until the plantation has been disinfected by spraying.

As soon as the fruit-grower has dealt with the diseased bushes, he should spray the whole of his gooseberries and currants with liver of sulphur, and repeat the dressing in a week. The spray for general use should be made up of 1 lb. liver of sulphur to 32 gallons of water. A stronger spray, say 1 lb. liver of sulphur to 24 gallons of water, may safely be used after July. It has been found that the spray wets the mildew and sticks better if soft soap is added to the wash at the rate of 1-2 lb. for 32 gallons of water.

Treatment of Diseased Plantation.—By adopting the line of treatment indicated above, the chances of stamping out the disease are good; but if from neglect or any other cause a garden has become generally infected with disease, a different procedure will be required.

It is impossible to say what is the best course to adopt in any particular garden, for once the disease has become widespread the treatment, to be successful, must vary according to the time of year, the weather, and the condition of the bushes. In general terms, however, it may be said that the grower's object must be to check the spread of the disease as much as is practicable while it is in its summer stage, and to cure it when it has passed into the winter stage. For advice in dealing with bad outbreaks the grower is recommended to consult one of the Inspectors of the Board or of the Local Authority. Inspectors are always glad to assist growers.

Two methods may be adopted in treating the summer stage: (1) spraying, and (2) removal of the diseased tips. The first remedy is the best in the early part of the season, up to about the end of July, while the second is the more effective from the middle of August onwards.

There is no doubt that a spray of liver of sulphur checks the disease if the spray soaks the mildew and dries upon it, but unfortunately it is difficult to ensure that the somewhat greasy surfaces of mildewed twigs are soaked with spray, and even when the twigs have been wetted, a fall of rain frequently washes off the spray before it has had time to dry. In practice, therefore, it is found that spraying, to be successful, must be frequent. Regular spraying is of special importance when the mildew appears early in the season, when young bushes in nurseries are attacked and when disease breaks out in a new district. In all cases in which neighbouring plantations are endangered by the presence of mildew, spraying must be resorted to.

As soon as active growth stops, growers should begin to remove and burn every twig showing disease. This is a valuable means of checking the spread of mildew in the early autumn. If begun too soon, however, bushes throw out many fresh shoots, and the soft tips so produced are very liable to infection. After the middle of August the buds would seldom "break," and in the case of old bushes growing on poor dry soil the removal of the tips may safely begin early in July. All diseased tips must in any case be removed by a date specified in the notices served under the Board's American Gooseberry Mildew Order, and the sooner this can be done the better for the grower himself.

On diseased twigs in the early autumn mildew is found in both the summer and winter stages. Twigs showing the summer stage are highly infectious, and if they are removed many adjacent bushes will be saved from disease; further, the summer stage soon changes into the winter stage, so that even if the grower does not remove the diseased wood in August he will be forced to do so a month or two later. He has, therefore, little to gain and much to lose by delaying the removal of the tips of gooseberry shoots affected by the summer stage of the disease.

As regards twigs suffering from disease in the winter stage, there is also a good reason for their early removal, for the winter fruits begin to drop off the bushes and to infect the soil a few weeks after they are formed. If, for example, mildew attacks a crop in the middle of July, the winter fruits

may begin to drop off by the end of August. The only chance the grower has of curing a bad attack of mildew is to destroy the winter fruits, and if he wishes to do so he must begin pruning in good time. It is true that a number of winter fruits remain attached to the wood, so that by pruning even as late as February he is *reducing the risk of a severe attack* in the following summer; but if he does not begin his work *early* so as to prevent the winter fruits dropping into the soil, it is very unlikely that he will effect *a cure*; the chances are that he will have the whole of the work to do over again the following summer.

Fruit-growers are busy during the early autumn months and labour is difficult to obtain, but in view of the dangers entailed by delay, strenuous efforts should be made to remove diseased tips in August and September. In any case, the suckers which grow in an affected plantation must be pulled up and destroyed, as suckers are very liable to contract disease.

Diseased tips should not be allowed to fall on the ground, but should be thrown into iron buckets, or baskets lined with sacking, as soon as they have been pruned off the bushes. As a further precaution against re-infection, the soil of gooseberry plantations should be dug over in winter and the surface buried as deeply as possible.

Dry Scab of Potatoes.—A recently-issued number of the *New Bulletin* reported the discovery in Great Britain of three cases of the potato disease known

**Notes on Insect,
Fungus and other
Pests.**

as Dry Scab.* During the month of April two further cases have come to the Board's notice, both from Perthshire. This disease, which has till

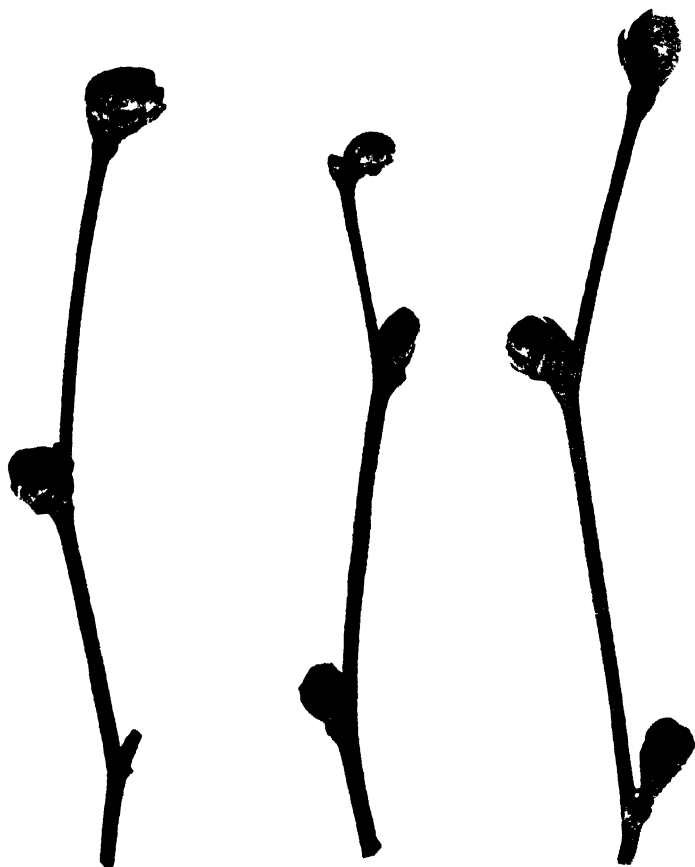
recently been known under the scientific name of *Phellomyces sclerotiphorus*, Frank, and is now called *Spondylocladium atrovirens*, Harz, has been known on the Continent since 1871, and in Ireland since 1903. The presence of this disease has not previously been confirmed in Great Britain, but the correspondent who sent up the potatoes from the Isle of Ely states that he had the disease rather badly five years

* See JOURNAL, April, 1909, p. 31.

ago. The disease appeared on Evergood potatoes, which were apparently quite clean when harvested, but in April they had so deteriorated that they fetched a very low price. As stated in the *Kew Bulletin*, the injury is confined to the tubers, and no indication of its presence is suggested by the foliage, which remains unaffected. The disease is revealed by the occurrence of blackish-olive or blackish-violet patches, which soon become depressed below the general surface of the tuber, due to drying and breaking up of tissue. Very frequently only one or two such sunken areas, which vary from half an inch to an inch across, are present on a tuber. Portions of the skin readily peel off in flakes, and if these remain in the soil they are a source of danger to future crops. But although only a part of the potato appears to be diseased, it is certain from the way the fungus appears that parts that seem free are affected. It is, therefore, most dangerous to use or set any potatoes that show any signs of being affected. Professor Johnson, who first recorded the presence of the disease in Ireland, made some attempt to find out whether by soaking the tubers for an hour in a solution of formalin (0·8 per cent.) the disease could be eradicated. The result was apparently successful (*Economic Proceedings of the Royal Dublin Society*, Vol. I., Part V., No. 6). At the same time, he demonstrated the importance of preventive measures by showing that perfectly healthy potatoes brought from France and planted in a district where disease is common became infected at once. An account of the disease and its appearance in Germany is given in Frank's "*Kampfbuch gegen die Schädlinge unserer Feldfrüchte*."

Grease-banding for Winter Moth.—Reports have reached the Board that grease-banding for winter moth is increasing in popularity in many parts of England, but from time to time complaints are made that the bark of certain trees is affected injuriously by the practice. An instance where such a complaint was made has recently been investigated by one of the Board's Inspectors. He found some trees on which the grease had run right down to the ground, a distance of two or three feet, while the bands themselves were quite rotten. Some trees had been recently greased again, and it was stated that £3 per cwt. had been paid for the grease,

although at a town at no great distance the price was 17s. and 13s. 6d. per cwt. for black and white grease respectively. To obviate running in another season, the owner was advised to apply white grease in October, as being less liable to melt in the sun, and black grease later on as being less liable to go hard with cold, should any fresh greasing be necessary.



HAEZL BUDS ATTACKED BY MITE

Hazel-Bud Mite.—Towards the beginning of April a package of cob and filbert nut shoots was sent to the Board, with a statement that they formed part of a large consignment. They were forwarded from a well-known nursery firm in the neighbourhood of London. A number of the buds were much swollen (*see* illustration), and showed signs of being affected with the Hazel-Bud Mite, *Eriophyes avellanæ*, Nal., but on closer examination the mites were not found to

be present in great number. A full account of this mite appeared in this JOURNAL for February, 1908.

Green-fly on Potatoes.—A correspondent in Glamorgan sent a specimen of a boxed potato covered with green-fly, which he had noticed in March. The aphides, which are still under observation, appear to be the species *Aphis dianthi*, Schr., which is recorded as having been taken on a number of plants, including wild species of *Solanaceæ*.

The soy bean (*Glycine hispida*), sometimes called the soja bean, is a leguminous plant, and a native of south-eastern Asia. There are many varieties known

Soy Beans. in Japan, China, Tibet, and the temperate portions of the Himalaya. In

the United States the varieties known and grown are yellow, black, green, and brown soy, so named from the colour of their seeds, with, in addition, Étampes soy, which has seed like yellow soy, but grows to a height of over 2 ft., all the other varieties being only from 1-1½ ft. high. The soy bean requires about the same temperature as maize, and it may therefore be capable of growth in some of the southern and eastern parts of England. The Board have arranged for some experiments to be conducted with beans obtained from Japan.

According to the *U.S. Farmers' Bulletins* (Nos. 58 and 97), the methods of cultivation are similar to those required for ordinary field beans. It thrives best in soils of medium texture, well supplied with lime, potash, and phosphoric acid. Like other leguminous crops, it accumulates nitrogen in the nodules on its roots, and thus enriches the soil for the next crop. It endures drought well, and is not easily injured by excess of moisture.

The early varieties are best for seed crops, and the medium or late varieties for hay or forage. Seed may be planted at any time during the spring and early summer, but preferably as soon as the ground becomes thoroughly warmed. One-half to three-quarters of a bushel to the acre may be drilled, but about one-quarter of a bushel more if sown broadcast.

Little cultivation is needed when growing for forage, but if grown for beans, weeds must be kept down. The crop should be cut for hay when in the late bloom or early podding

stage; for ensilage the crop can be cut later, but it is better to cut before the pods begin to ripen; for green forage, cutting may begin earlier and continue rather later than for either hay or ensilage; the crop may be cut for seed after the pods become about half-ripe.

Owing to its coarse habit of growth, the soy bean is somewhat difficult to make into hay in moist climates, and the plant is liable to lose a large part of its leaves, but there can be no question as to its high feeding value when cut at the right season and properly cured.

It is probably best used as green forage. The great variation in the season of maturity of the different varieties makes it possible to have a succession of forage throughout the greater part of the summer and autumn. It is stated to be excellent for dairy cattle, though stock do not always relish it at first.

It has also been successfully made into silage in the United States.

The Board have received, through the Foreign Office, a report prepared by Mr. G. P. Devey, H.M. Consul at Damascus, on the "Agriculture, Tithes, and Taxes of the Syria Vilayet." This report can be inspected at the office of the Board, 8 Whitehall Place, S.W.

**Agriculture in
Syria.**

It appears that in an average year the production of this Vilayet, the area of which is about one-fourth that of the British Isles, is 6,500,000 bushels of wheat, 2,200,000 bushels of barley, together with chick peas, maize, millet, lentils, and peas, bringing up the total yield to 9,333,000 bushels. Of this quantity about 500,000 bushels are exported through the ports of Haifa and Beirut, 2,000,000 bushels go to other parts of Syria, while the remainder is consumed at home. These figures can only be regarded as approximate, no reliable statistics being in existence. The crops in 1908 were exceptionally productive, and the yield was probably 30 per cent. more than the above estimate.

Farming is as yet carried on in this province with primitive simplicity, and no new methods or implements have been introduced. No good systems of irrigation exist, and

the traditional practices of ancient times are still followed. With new methods of agriculture and proper irrigation, the produce could easily be doubled without adding to the cultivated area, with the result that a considerable surplus might be available for export.

In the Annual Report (1907-8) of the Department of Agriculture, British East Africa, it is stated that in addition

**Live Stock in
British East
Africa.**

to a number of cattle purchased by the Department for the establishment of pure-bred herds, a large number of bulls have been imported by settlers for grading up the native cattle possessed by them. There are now in the Protectorate representatives of the Shorthorn, Hereford, Friesland, Ayrshire, Devon, and Kerry breeds. Judging from the number imported, the Shorthorn would appear to be the favourite breed, but, irrespective of the breed, the half-breds now to be seen on many farms show a marked improvement over the native cattle, and everything points to the grading up of the native cattle as likely to be a decided success.

The native sheep have been found to improve readily by the use of Merino sires, and it is along this line that the general development of the sheep industry is likely to proceed. At the Government Stock Farm at Naivasha, Welsh, Suffolk, Shropshire, and Kerry rams are kept as well as Merinos, and it is stated that the first cross yearlings of the three latter breeds are very promising.

The prospects for pig-breeding are very good, and both the Berkshire and Large Black breeds are kept at the Government farm.

So far horse-breeding has received but little attention, but the Government have been requested to import a stallion with a view to the establishment of a small stud at the farm.

In making clotted or scalded cream, the practice of adding a little water to the milk before scalding appears to be adopted to a small extent in some parts

"Scald Milk." of Devonshire. This is apparently done with a view to facilitate the rising of the cream, or with the object of preventing the cream

adhering to the pan. The milk which is left after the cream has been removed is, however, frequently sold under the name of "scald milk" and in such cases the alteration in the composition of the "scald milk" caused by the above-mentioned practice, as compared with that of normal "scald milk," may render the seller liable to prosecution under the Sale of Food and Drugs Acts. Recently the Plymouth Corporation instituted proceedings against a seller of milk of this type, on the ground that it contained added water, and a conviction was obtained.

In the course of inquiries made in connection with this case, the Board were supplied with particulars of an experiment made to determine the effect of adding water to milk when set for the production of clotted cream, which throw some light on the point at issue.

A well-mixed afternoon milk was used, and six pans containing 19 lb. milk each were set at a temperature of 70° F., the temperature in the dairy being 55° F. Pans Nos. 1 and 2 contained milk only, while 1½ lb. water was added to Pans 3 and 4, and 2½ lb. to Pans 5 and 6 respectively. The milk was scalded 17 hours after setting, and skimmed 22 hours after scalding. The results were as follows:

—	1	2	3	4	5	6
	lb oz	lb oz	lb oz	lb oz	lb oz	lb oz
Scald milk produced, total	17 2½	17 3½	18 7½	18 7½	19 11¼	19 12¼
Scald milk, less added water	17 2½	17 3½	17 3½	17 3½	17 3½	17 4½
Cream produced	1 4½	1 4½	1 4½	1 4½	1 3½	1 4½
Weight of "fur"	0 0½	0 0½	0 0½	0 0½	0 1	0 0½
Loss by evaporation	0 8½	0 7½	0 7½	0 7½	0 8	0 6½

It will be seen from this that the addition of water did not affect the quantity of cream produced, neither did it reduce the "furring" of the pans. The "fur" is deposited on the sides and bottoms of the pans, particularly the latter, in distinct particles about the size of a pin's head. The "fur" probably varies with the condition of the pans, as it adheres more readily to any rough patches of metal. There is also a "scale," which is probably chiefly fat and albumen.

Some samples of these were examined at the Government

Laboratory, and the composition was found to be as follows :—

				" Fur."		" Scale."	
Water	...	...	...	69.17		38.81	
Fat	...	...	...	6.35		51.17	
<i>Non-fatty Solids :—</i>							
Proteins	...	...	...	17.46	} 24.48	4.15	} 9.02
Lactose	...	...	...	5.58		4.36	
Ash	...	...	...	1.44		0.51	

No attempt was made to separate the milk albumen and casein, as the samples had undergone some decomposition.

It will be seen that the "fur" contains a much greater proportion of albuminoids to lactose than is found in the non-fatty solids of milk, whereas the non-fatty portion of the "scale" contains less albuminoids and more milk-sugar than the "fur," and more nearly approaches the composition of non-fatty milk solids.

As regards the effect of the separation of the "fur" upon the composition of the "scald milk," the loss of $\frac{1}{2}$ oz. of "fur" of the above composition upon an operation dealing with 19 lb. of milk is much more than counterbalanced by the evaporation of water during the operation, or even by the proportionate increase of the percentage of non-fatty solids owing to the removal of the fat alone. For example, in the case of the results obtained with Pan No. 1 above, where the loss by evaporation is $8\frac{1}{2}$ oz. and the loss by "fur" $\frac{1}{2}$ oz., if the original milk contained 8.5 per cent. of non-fatty solids, and taking into account the non-fatty solids removed with the cream, the resulting "scald milk" would contain 8.80 per cent. of non-fatty solids.

There is, therefore, no danger of a charge arising for deficiency owing to the separation of "fur" during the operation of scalding.

The economic problems of rural life, which in Europe have found their expression in the migration of the agricultural classes from the country to the towns, have their counterpart in the United States, where, notwithstanding the comparative prosperity of

**Rural Conditions
in the
United States.***

* *Report of the Country Life Commission.* Special Message from the President of the United States transmitting the Report of the Country Life Commission. Washington, 1909. (Document No. 705.)

agriculture during recent years, the cities still tend to attract the best elements in the rural population.

These problems have been considered by a Commission appointed by President Roosevelt to inquire into the present condition of country life in the United States, and the Report of the Commission has recently been presented to Congress, with a Special Message from the President. The object of the Commission was not to help the farmer to grow better crops, but to consider the means of raising the standard of living, and generally of making the farmer's calling more attractive. In his letter appointing the Commission, Mr. Roosevelt observes that :—"There is too much belief among all our people that the prizes of life lie away from the farm. I am therefore anxious to bring before the people of the United States the question of securing better business and better living on the farm, whether by co-operation between farmers for buying, selling, and borrowing; by promoting social advantages and opportunities in the country; or by any other legitimate means that will help to make country life more gainful, more attractive, and fuller of opportunities, pleasures, and rewards for the men, women, and children of the farms."

After considering the Report of the Commission, Mr. Roosevelt states that the three great needs of country life in the United States are :—

1. Effective co-operation among farmers, to put them on a level with the organised interests with which they do business.

2. A new kind of schools in the country, which shall teach the children as much outdoors as indoors, so that they will prepare for country life, and not, as at present, mainly for life in town.

3. Better means of communication, including good roads and a parcels post, which the country people are everywhere unanimous in demanding.

The recommendations of the Commission cover these and many other points, some of which are of purely local interest, but the Commission indicate three measures for the improvement of the rural situation which they regard as fundamental :—

(a) The investigation of agricultural conditions on a comprehensive plan, organised under Government leadership, with a view to "an exhaustive study or survey of all the conditions that surround the business of farming and the people who live in the country, in order to take stock of our resources and to supply the farmer with local knowledge."

(b) The general dissemination of information by agricultural colleges, by such means as lectures, bulletins, reading courses, correspondence courses, demonstration work, &c., with a view of reaching the people on their farms. This work, the Commission observes, "should be designed to forward not only the business of agriculture, but sanitation, education, home-making, and all interests of country life."

(c) The holding of conferences on rural life with a view to uniting the institutions, organisations, and individuals having interests in country life.

Among the difficulties which were brought to the notice of the Commission, the lessening productiveness of the land owing to soil exhaustion may be mentioned as being of interest to English farmers. The practice of cultivating the virgin soil until it begins to yield with difficulty, and then moving to new areas, is now greatly checked because most of the available lands have been occupied. In many parts no change of system has followed the depletion of the natural fertility, so that extremely poor yields are obtained. It is stated that a really scientific and self-perpetuating agriculture is only beginning to appear here and there, mostly in the long-settled regions; while a certain class of the population is forced to the poor lands, thus becoming a handicap to the community and constituting a very difficult social problem.

The great agricultural need of the open country is a system of diversified and rotation farming, carefully adapted to the particular district. The wastage of soil resources is, the Commission observes, "a general feature of our agriculture, due to a lack of appreciation of our responsibility to society to protect and save the land. Although we have reason to be proud of our agricultural achievements, we must not close our eyes to the fact that our soil resources are still being lost through poor farming. This lessening of soil fertility

is marked in every part of the United States, even in the richest lands of the prairies. It marks the pioneer stage of land usage. It has now become an acute national danger, and the economic, social, and political problems arising out of it must at once receive the best attention of statesmen."

The supply of agricultural labour also constitutes a problem of some importance, the conditions affecting it being in many respects similar to those prevailing in this country.

One of the most interesting steps taken by the United States Department of Agriculture for the improvement of agriculture is what is known as the Farmers' Co-operative Demonstration Work, which places a practical object-lesson before the smaller farmers with the view of illustrating the best and most profitable methods of producing crops. It has been developed chiefly in the southern portions of the United States, where education, wages, profits, and rural conditions generally are on a lower plane than other parts of the Republic.

Active work commences in October by calling public meetings in each district, at which the advantages of improved methods are explained. Demonstration plots are arranged on the farms of men who will agree to follow instructions, in such a way as to admit of every farmer in the neighbourhood seeing one or more of them during the season. Each month instructions are sent to every demonstrator and co-operator, clearly outlining the plan for managing the crop (chiefly cotton, maize, tobacco), and, in addition, a local agent calls each month to explain anything not understood in the instructions. All the co-operating farmers are invited to meet the State Agent at one of the demonstration plots with the view of discussing the methods, and it has been found that these meetings have been wonderfully effective in arousing local interest. A circular setting out the fundamental requirements of good farming is sent out in advance to provide a basis for discussion.

It is regarded as of the greatest importance to confine the work to a few leading crops, and the instruction to the basic

methods and principles which lead to the best results, and to repeat this line of instruction until every farmer knows the methods that make for success.

The demonstration work appears to have been remarkably successful, not merely in improving the crop yields, but indirectly, through the increased earnings resulting therefrom, in bettering the conditions of rural life.

CANADA.—With reference to the Regulations for the importation into Canada of animals for the improvement of stock, which were given in this *Journal*, January, 1909, p. 762, the Board are now informed through the Colonial Office that these Regulations have been amended, the amendment coming into force on March 1st last.

**Live Stock
Regulations Abroad.**

The new Regulations define the list of registers, in one of which animals must be registered as pure bred, prior to admission free of duty for the improvement of stock, as follows:—The Holstein-Friesian Association of Canada, St. George, Ont. (for Holstein-Friesian cattle); Canadian National Records, Ottawa (for horses, cattle, sheep, goats, asses and swine, but not including Holstein-Friesian cattle); and also any register certified by the Accountant of the Canadian National Records as a recognised book of record in the country of the origin of the breed.

In an explanatory memorandum it is stated that to obtain free Customs entry of an animal of a breed for which there is a Canadian Record (other than Holstein-Friesian cattle) the importer must forward to the Accountant, Canadian National Records, Ottawa, the foreign certificates of registration, accompanied by the necessary fees for registration as specified in the memorandum, and in addition, for Import Certificate, a fee of 50 cents for horses and cattle, and 10 cents for swine and sheep. The Import Certificate will be forwarded to pass Customs at the point of entry into Canada or elsewhere as the importer may direct. In no case should the importer present any certificate to the Custom Authorities other than the Import Certificate. Importers should be careful to observe the veterinary requirements in connection with the importation of animals. Full information may be procured from the Veterinary Director-General, Ottawa.

The breeds for which there are Canadian books of record are as follows:—

Horses.—Clydesdale, Hackney, Shire, Percheron, Thoroughbred, Belgian Draft, French Canadian, and Shetland, Welsh, New Forest, Polo and Riding, Exmoor and Hackney Ponies.

Cattle.—Shorthorn, Ayrshire, Hereford, Jersey, Galloway, Aberdeen-Angus, Guernsey, French Canadian, Red Polled, Holstein-Friesian.

Swine.—Yorkshire, Berkshire, Tamworth, Chester White, Poland China, Duroc Jersey, Essex.

Sheep.—Shropshire, Leicester, Oxford Down, Cotswold, Lincoln, Dorset, Hampshire, Southdown, Suffolk, Cheviot, Blackface.

In order to secure the free Customs entry of an animal of a breed for which there is no Canadian Record, but which is recorded in a foreign record recognised as reliable, the importer must forward to the Accountant, Canadian National Records, the foreign certificate of registration accompanied by fees as follows:—For horses, cattle, or asses, \$1 each; for sheep, swine, or goats, 50 cents each.

The British Records of breeds, which are recognised, are as follows:—

Horses.—Suffolk, Cleveland Bay, Yorkshire Coach, Hunter.

Cattle.—Highland, Kerry and Dexter, Sussex, Devon, Longhorned Cattle, Welsh Black Cattle.

Pigs.—Large Black Pig, Lincolnshire Curly Coated Pig.

Sheep.—Kent or Romney Marsh, Wensleydale Longwool, Wensleydale Bluefaced.

Goats.—British Goat Society, Toggenburg.

The memorandum above referred to, which can be inspected at the Office of the Board, 8, Whitehall Place, also contains information as to the eligibility of animals for Canadian Records and other particulars.

In connection with these Regulations the Board have received a copy of a memorandum prepared by Dr. J. G. Rutherford, Live Stock Commissioner, in which it is observed that all animals recorded in British books of record are eligible for the corresponding Canadian Books of Record with the exception of Shorthorn, Jersey, and Guernsey cattle, and Hackney and Clydesdale horses. Animals of these breeds must be bred as indicated in the memorandum, and in the case of Jersey cattle, importers must observe the import regulations of the Canadian Jersey Cattle Club.

A movement is on foot to restrict the entry in the Canadian Stud Book of Hackney horses imported from Great Britain. The proposed amendment to the regulations is that only stallions fully registered in the English Hackney Stud Book may be admitted if they are by fully registered sires and out of fully registered dams, and mares by fully registered sires, and out of dams registered or half-registered.

Regulations governing admission of animals to registration in the Canadian books correspond to rules governing admission to the American books on account of the trade between the two countries.

In connection with recording foreign pedigrees the Canadian Record Associations do not charge fees similar to those charged by the American Shorthorn Association or the American Hackney Horse Society.

FRANCE.—The legislation dealing with animal diseases in France has recently been amended by a law dated January 12th, 1909, which provides that a staff to deal with contagious disease shall be established in each department within one year from that date. Previously, although the existence of suitable means for controlling disease was contemplated by the law, it was not compulsory, so that administrative methods in the different Departments varied very greatly.

Under the new law, a Departmental Veterinary Surgeon is to be appointed subject to the approval of the Ministry of Agriculture, and it will be his duty to ensure the application of the laws and regulations

relating to the sanitary condition of animals. A grant of £210 annually will be made to each Department by the Government towards the salary of this officer.

HOLLAND.—The Board of Agriculture and Fisheries have received, through the Foreign Office, a translation of a Decree issued by the Dutch Ministry of Agriculture, and dated March 19th last, providing that animals of the equine species imported at Rotterdam from the United Kingdom may, on certain conditions, be conveyed to Amsterdam for slaughter. It is provided that the animals must be examined by the district veterinary surgeon at Rotterdam and a certificate issued stating that they were not suffering from glanders, lung disease, influenza, or epizootic lymphangitis, and that the existence of these diseases was not suspected; and also that they were not suffering from a violent skin disease, and were free from serious wounds or painful bodily defects, and were fit for conveyance by rail. These certificates are to be issued free of charge. Other sections of the Decree provide for the conveyance of the animals under supervision.

The Board of Agriculture and Fisheries have made an Order, under the Diseases of Animals Acts, 1894 to 1903, revoking their Order of November 18 last which prohibited the landing in Great Britain of live animals brought from the State of Pennsylvania. Animals brought from that State may now be landed at any Foreign Animals Wharf in Great Britain for the purpose of slaughter thereat.

**Admission of Live
Stock into Great
Britain from the
United States.**

All Orders prohibiting the landing of live animals from certain States which were issued in consequence of the outbreak of foot-and-mouth disease in the United States of America have now been revoked, but the Orders prohibiting the landing of hay or straw from the States of Pennsylvania, New Jersey, New York, Maryland, and Delaware still remain in force.

A law dated January 25th, 1909, and published in the *French Journal Officiel* of March 24th last, requires plants of a fibrous nature (other than vines and resinous plants), and palms rooted

**Importation of
Plants into Algeria.**

or otherwise, without earth, coming from abroad and from certain French departments for importation into Algeria, to enter through specified ports. On their arrival, these products are to be disinfected with hydrocyanic acid gas, at the expense of the importer, by an officer appointed by the Government.

The law, dated March 10th, 1894, relating to the importation into Algeria of trees, shrubs, and plants of all kinds (other than vines) still remains in force. This law provides that such products must be accompanied, as required by the Phylloxera Convention, by a declaration by the consignor and a certificate issued by the competent authority of the country of origin, to the effect (1) that they come from a plantation separated by a distance of at least 20 metres (22 yards) from any vine or by an obstacle to the roots (such as a ditch or a wall) which is con-

sidered to be sufficient by the competent authority; (2) that this plantation contains no vines; and (3) that no vines are deposited there; and that, if it has been attacked by phylloxera, subsequent operations extending over three years have ensured the complete destruction of the insects and of the roots.

An Order-in-Council, dated March 5th, has been received from the Colonial Secretary, Grenada, which provides for the free importation into

**Importation of
Insecticides into
Grenada.**

the Colony of the following articles: Any substance or preparation used in agriculture as an insecticide or fungicide, when the Governor in Council is satisfied, on the evidence of a statutory declaration, that such substance or preparation is intended to be used as aforesaid and for no other purpose.
—(*Board of Trade Journal*, April 8th, 1909.)

Horse Show at Paris.—The annual exhibition of stallions and mares arranged by the Ministry of Agriculture (Direction des Haras) will be held at Paris from June 16th to 20th. This

Exhibitions Abroad.

show includes thoroughbreds, half-breds, draught horses, asses, and mules, and the prizes amount to £8,250, together with a large number of gold, silver, and bronze medals. The show is confined, however, to animals born in France.

Machinery at Winnipeg Exhibition.—An international competition for light agricultural motors will be held at Winnipeg from July 10th to 17th next during the annual Winnipeg Industrial Exhibition. All entries must be made on or before June 1st. Any exhibit will be brought to the notice of agriculturists throughout the Canadian West. It is stated that the use of motors for hauling, ploughing, and other farm work is steadily increasing throughout Western Canada.

The conditions, &c., may be seen by British firms interested on application at the Commercial Intelligence Branch of the Board of Trade, 73 Basinghall Street, London, E.C.—(*Board of Trade Journal*, April 15th, 1909.)

Turkey.—H.M. Consul at Adrianople (Major L. L. R. Samson) has furnished the following particulars which appear to indicate possible openings for trade in the Vilayet of Adrianople:—

**Demand for
Agricultural
Machinery Abroad.**

Ploughs are imported from Austria-Hungary and Germany in the proportion of 20 and 80 per cent. respectively. Their cost varies from £T2½ to £T3 each (£2 5s. 5d. to £2 14s. 6d.). They are supplied on twelve months' credit. The bad harvest of 1907 made its influence felt during 1908 in the sale of this article, which diminished by about 66 per cent. as compared with the preceding year. The total sales amounted to only 500.—(*Board of Trade Journal*, April 15th, 1909.)

India.—According to *Indian Engineering* (Calcutta) of March 13th, the Director of Agriculture has, it is understood, obtained the

sanction of the local Government to the establishment of an agricultural machinery depôt in the Punjab on somewhat similar lines to the depôt established some time ago in the Central Provinces. The local authorities are convinced that the demand for such machinery, the practical utility of which has been proved, is likely to be large in the Punjab. It is proposed to charge purchasers $6\frac{1}{2}$ per cent. over cost price on sales of machinery stocked, and 2 per cent. on sales bought on specific orders.— (*Board of Trade Journal*, April 15th, 1909.)

Caucasus—H.M. Consul at Batoum (Mr. P. Stevens) reports as follows regarding the opening in the Caucasus for agricultural implements and for machinery (*F.O. Reports, Annual Series*, No. 4, 198):—

The Northern Caucasus, being a purely agricultural country, affords a good field for the sale of a variety of agricultural implements. Rostov-on-Don is the centre at which most of the leading British agricultural implement manufacturers are represented, and to which landed proprietors in the provinces of Kuban and Ter and the government of Stavropol proceed in order to purchase the implements they require for working their lands. Threshing machines and engines, as well as machinery of smaller dimensions ordered by farmers in the districts referred to, are shipped from the United Kingdom to Novorossisk, where they are discharged for conveyance by rail to their destination.

In addition to locally manufactured implements, such as ploughs, a good deal of larger agricultural machinery, of German make, has recently been introduced into the district; it is sold at a lower price, and on more convenient terms of payment, than British manufacturers are prepared to accept, but the work executed by the German article is said to be not so satisfactory as the work turned out by British-made machinery.

The use of agricultural implements in the Trans-Caucasus is not so general as it is in the Northern Caucasus. In the western and south-western portions of the Trans-Caucasus, the land to be cultivated lies principally on steep slopes of hills and in marshy country. Want of knowledge on the part of the natives as to modern methods of working the soil, their impecunious condition, and their unwillingness to endeavour to improve the land they cultivate, retard the development of the sale of improved agricultural implements on this side of the main Caucasian chain, although in the Eastern Trans-Caucasus and in Central Asia a limited business in agricultural implements of British and local make is annually carried on through agencies of the Rostov firms domiciled at Baku.

Demand for Agricultural and Dairy Machinery.—Reports on the demand for agricultural machinery appear in the U.S. Consular Reports as follows:—Russia and Siberia (No. 3352, 3355, 3359); Canada (3360); Austria Hungary (3377); Chili (3380); Norway and Sweden (3282); and Turkey (3392). The Reports as to Russia and Siberia are furnished by a Special Agent of the U.S. Department of Commerce, who is investigating the opportunities for American trade in agricultural machinery.

The weather during the month of April was in marked contrast to the weather of March. The *first* week (April 4th to April 10th) was unusually brilliant. Temperature was practically everywhere "very unusual," rainfall "very light" or "nought," and sunshine "very abundant." During the *second* week the temperature was changeable and showery. Warmth was "unusual" everywhere, but in Great Britain sunshine was only "moderate." Rainfall was above the average in all the more western and northern districts, but below it elsewhere. In Scotland and the north of England the excess was large. The number of accumulated day degrees above 42° for the week was large, and for the season (six weeks, March 7th to April 17th) there was in most districts an amount above the normal, showing that for those six weeks the season was not behindhand. For the year, however, the case was reversed, and the number of accumulated day degrees was below the average. Night frosts took place almost everywhere. In the *third* week the weather was again favourable; warmth was "unusual" everywhere, sunshine was "abundant" (England, E., "very abundant"; S.W., "moderate"), while rainfall was "heavy" or "very heavy." A few night frosts occurred. The record of accumulated day degrees was above the normal, and even for the year the deficit was by this time small, while for the season it was in excess.

The *fourth* week was characterised by rain, the excess in the East and North-East being heavy. Temperature was a little below normal, and bright sunshine was "abundant" or "very abundant" in most places. The rainfall for the year was by this time almost normal, some places recording a slight excess and some a slight deficiency in the number of rainy days and the amount of actual rainfall. Except in East Scotland, where there were 2·85 more inches of rain than usual, the difference was in no place great. For the season (March 7th to May 1st) rainfall was everywhere above the average.

The conclusions that might be drawn from the foregoing report are borne out by the letters of the Board's correspondents. One writer from Berkshire declares fruit prospects to be good, cherries, pears, and plums being a sheet of white blossom, while currants and gooseberries were laden with young fruit. "Planting, on the whole," he says, "was late, but the genial month we have had will largely level up arrears." Another writer from Berkshire says, "Vegetation is a little backward; great progress has been made with planting of corn, and it is now (May 1st) practically finished, and the prospect for crops was never better. Fruit trees are all in full bloom, and it appears probable that there may be an abundant crop of fruit." From Midlothian, however, it is stated, "practically speaking, everything is late. There has been no growth to mention. Potato-planting is still being undertaken. Fruit trees are well clothed with blossom, and the bulk of opinion is that the year is likely to be a good fruit year."

Hungary.—According to the report of the Ministry of Agriculture on the crops at the beginning of April, the condition of wheat and rye was, on the average, satisfactory. This was confirmed in the report issued in the middle of the month, although the weather during the first half of April was not very favourable

**Notes on
Crops Abroad.**

to the crops. Complaints were made of the condition of winter barley and rape, which appeared to have suffered from the long winter; in most parts of the country they are poor, and in places have been ploughed up. Spring sowing is in progress, and has been favoured by the weather.

Germany.—The report issued by the Imperial Statistical Bureau for the middle of April gives the arithmetical condition of the crops as follows:—Winter wheat, 3'1; winter spelt, 2'7; winter rye, 3'0; clover, 2'8; and Lucerne, 2'7 (1=very good, 2=good, 3=medium or average, 4=small). The figures for the three grain crops at the same time last year were, respectively, 2'5, 2'3, and 2'6.

The condition of the autumn-sown grain crops is, in general, only medium, in consequence of the late sowing which resulted from the autumn drought. The hope is expressed that, with mild weather and sufficient moisture, they will recover from the damage they have suffered during the winter.

Holland.—According to a report issued by the Dutch Ministry of Agriculture on the 22nd April, the weather in the autumn was dry and, on the whole, favourable for the winter grain. The winter, however, was cold and unfavourable, and the state of the crops is very backward throughout the country, though less so in the south than in the north. Except in Zeeland, wheat had to be reploughed more or less in nearly all provinces. The condition of wheat is, on the whole, indifferent. Red clover and cabbage seed have suffered a good deal, it being estimated that not more than 30 per cent. of the cabbage seed sown remains. Pasture is also very backward in development.

As regards horticultural produce, there is a general complaint of the consequences of a long and severe winter, and many kinds of vegetables are backward. In Westland it is stated that only plants under glass show healthy signs. In the open air the results are moderate and even bad.

In the nurseries the winter did not make itself so seriously felt. Although in the neighbourhood of Boskoop conifers suffered slightly, and in some places rose-bushes which were insufficiently covered were destroyed by frost, the condition of plants is generally described as good or very good.

Canada.—The total grain production of Canada in 1908 is given by the Ministry of Trade and Commerce as follows: Wheat, 126,795,137 bushels; oats, 254,615,670 bushels; barley, 47,242,130 bushels; peas, 8,265,869 bushels; maize, 24,817,835.

Victoria.—According to *Dornbusch's Evening List* (April 1st) the wheat yield of Victoria for the current year is officially estimated at 23,345,000 bushels, as compared with 12,100,000 bushels last year.

India.—According to the Second General Memorandum on the Wheat Crop, the total area sown for the season 1908-9 is 25,985,200 acres, as

compared with 21,675,800 acres last year, and 27,063,900 acres, the average for the five years ending with 1906-7. On the whole, the condition of the crop is reported to be satisfactory, but the unirrigated crop in the United provinces is said to be poor, and in many places further rain was greatly wanted at the time of making the report.

Argentina.—H.M. Consul at Rosario (Mr. H. M. Mallet) reported on March 2nd that the wheat and linseed crops were safely harvested, but had not, owing to prolonged drought, given nearly so large a yield as was anticipated. The maize crop suffered considerably in some districts from drought and locusts. Although a much larger area was sown with grain than in the previous year, the quantity of wheat and linseed available for export will probably be less. Mr. Mallet gives the following figures, which, he says, may be taken as a fairly correct estimate of the quantity of grain available for export during the current year, compared with the export in 1908:—

	1909 Tons.	1908. Tons.
Wheat	2 600,000	3,600,000
Linseed	1,250,000	1,790,000
Maize	3,000,000	1,065,000

Russia.—H.M. Consul-General at Odessa (Mr. C. S. Smith) has forwarded a summary of an article in the *Torgovo-Promyshlennaya Gazeta* (April 5th/18th, 1909) which states that, on the whole, the grain crops of southern Russia have passed through the winter well. The cold weather set in prematurely about the beginning of November, and damaged some of the young shoots. The winter was rigorous, and the spring has come a fortnight or so late, but, except in Bessarabia and the south of Kherson and Taurida, there was good snow cover. The effect of a late spring is, moreover, not unfavourable when the thaw is slow enough to let the water sink in rather than flow away, while there is also less risk from late frosts.

It is stated that in some places more ground will be sown with summer grain than last year, partly because some of the fields meant for winter grain were left unsown. In many parts of the Taurida and in places in the Don territory where the winter crop has failed, spring grain will be sown. Damage from frost and floods is reported in some places; the amount of damage, however, is difficult to estimate, and is probably exaggerated.

United States.—According to *Dornbusch's Evening List* (May 7th) the Crop Reporting Board of the Bureau of Statistics of the United States Department of Agriculture finds that the area under winter wheat on May 1st was about 27,871,000 acres, 8'1 per cent. of the area sown (29,884,000 acres) having therefore been abandoned or given to other crops. The average condition on May 1st is given as 83'5, against 82'2 on April 1st, 1909, 89'0 on May 1st, 1908, and 86'0, the mean of the averages of the past ten years.

The average condition of winter rye on May 1st was 88'1, against 87'2 on April 1st, 1909, 90'3 on May 1st, 1908, and a ten-year average of 89'1.

Spring ploughing is not so forward as in the past two years, 64'1 per cent. of the acreage contemplated being actually done on May 1st,

compared with 66·6 per cent. on May 1st, 1908, and 71·5 per cent. in 1907. Of spring planting 51·9 per cent. is reported as completed on May 1st, compared with 54·7 per cent. in 1908.

The Board of Agriculture and Fisheries have been furnished by the Board of Trade with the following report, based on about 210 returns from correspondents in various districts, on the demand for agricultural labour in April.

**Agricultural Labour
in England
during April.**

Employment was generally regular throughout April, rain causing little or no interruption to outdoor work in most districts. Hoeing and other work provided much better employment for day labourers than in March, and the supply and demand for this class of labour were on the whole fairly equal.

Northern Counties.—Employment was somewhat interrupted by rain in *Northumberland* and *Durham*, and there was little demand for extra labourers. In *Cumberland*, *Westmorland*, and *Lancashire* potato planting, manure spreading, and other work caused a moderate demand for extra labourers; some time was lost through rain. Sowing corn, potato planting, &c., provided a fair amount of employment in *Yorkshire*, and the supply of and demand for labour were generally about equal. Some difficulty in obtaining cattlemen was mentioned by a correspondent in the *Driffield Union*.

Midland Counties.—Agricultural employment was generally regular in *Cheshire*, where sowing spring corn, manuring, and planting potatoes and mangolds afforded fairly good employment for extra men. Employment was fair in *Derbyshire* and *Nottinghamshire*, with an equal supply of and demand for labour. In *Leicestershire* employment was generally regular, but a surplus of day labourers was reported in certain districts. Carting manure, preparing land for potatoes and root crops, hedging, and ditching, &c., provided a fairly good demand for day labourers in *Staffordshire* and *Shropshire*, rain causing only slight interruption to employment. There was generally full and regular employment in *Worcestershire* and *Warwickshire*. The supply of day labourers was generally sufficient in *Northamptonshire*, but in the *Brixworth Union* men were wanted for hoeing and potato planting. In *Oxfordshire* and *Buckinghamshire* hoeing, threshing, hedging, &c., generally provided sufficient work for extra men, and there was a fairly good demand for such men in *Hertfordshire* and *Bedfordshire*.

Eastern Counties.—Employment was generally regular in *Huntingdonshire*. In *Cambridgeshire* hoeing afforded a good deal of work for extra labourers. The demand for this class of men was reported to be greater than the supply in the *Ely Union*. Sowing spring corn, hoeing, and preparing land for potato crops, &c., provided fairly plentiful employment in *Lincolnshire*. There was a fair demand for extra men in certain parts of *Norfolk*, but in several districts some surplus was reported. A number of day labourers found employment in hoeing, carting, and spreading manure, &c., in *Suffolk*, and the supply of and demand for labour were generally about equal, but in several districts, however, in this county and in *Essex*, some men were in irregular employment after threshing was finished in the early part of the month.

Southern and South-Western Counties.—Hoeing and other work on the land provided fairly good employment for extra labourers in *Kent*

and *Surrey*, although there was some surplus in several districts. Similar reports come from *Sussex* and *Hampshire*. There was generally an equal supply of and demand for labour in *Berkshire*. Hedging, ditching, threshing and hoeing caused a fair demand for extra labourers in *Wiltshire*, but there was an excess in the supply in several districts; some difficulty in obtaining men to look after stock was reported from the Chippenham Union. Employment was generally regular in *Dorset* and *Somerset*, with the supply of and demand for labour about equal. A correspondent in the Sturminster Union (*Dorset*) reports that there were more men seeking permanent places than has been the case for some years. Extra labourers in *Herefordshire* were fairly well employed at hedging, spreading manure, hoeing, &c. In *Gloucestershire* some scarcity of men for permanent situations was reported; the supply of extra men was about sufficient. There was generally regular employment in *Devonshire* and *Cornwall*, with an even supply of and demand for day labourers.

MISCELLANEOUS NOTES.

Timber in Siberia.—In a report on the Lumber industry in the Russian Far East, Mr. Vice-Consul Hodgson observes (*F.O. Report, Misc. Series, No. 670*) that it seems probable that, with the gradual depletion of the forests nearer home, Eastern Siberia will in future be called upon to supply to a considerable extent the demand for soft wood.

The forests cannot be compared in density with those of North America, but the area of land lying idle in the Maritime province is immense, and only approximate figures as to its extent can be given. The estimate of the Forest Department may be taken as sufficiently accurate, and this gives 509,000,000 acres in the Amur and Maritime provinces, of which 19,000,000 acres belong to the Cossack administration. Generally speaking, the forests are confined to the sea coasts, river beds, and valleys, the high lands and mountains being bare or covered with brushwood. The forests of Northern Manchuria must also be taken into account; they produce excellent timber, though the coniferous kinds are somewhat coarse-grained, but they are handicapped through being dependent on the railways for transport to Vladivostock, a distance of some 250 to 350 miles.

The report gives information as to the Government royalties, the species and quality of the timber available, together with the regulations and export duty in force in the Manchurian forests.

Failure of Hop-picking by Machinery.—H.M. Consul-General at San Francisco (Mr. W. R. Hearn) has forwarded a cutting from the San Francisco "Chronicle" of March 8th reporting the failure of hop-picking by machinery, experiments in which were conducted last season in the Sacramento Valley. It was found that the machines were not so economical in working as was expected, and wasted as much hops as they picked. If the experiments had been successful, it was anticipated that hop-growing would regain its former importance as one of California's leading industries, but further reductions of the acreage are now expected.—(*Board of Trade Journal*, April 8th, 1909.)

Bulb Trade of Holland.—H.M. Consul at Rotterdam (Mr. H. Turing) reports that the exports of bulbs from Holland in 1908 amounted

to 14,333 tons, as against 15,279 tons in the preceding year. The decrease is largely due to diminished imports into the United Kingdom, which were only 5,029 tons in 1908, as compared with 6,341 tons in 1907. During the last ten years the total exports have more than doubled, the figure in 1898 being 6,902 tons. Consignments by parcel post are not included in these figures.

Peat for Fuel and other Industrial Purposes.—An officer of the Canadian Department of Mines (Mr. E. Nystrom) was recently instructed to investigate the peat industry in various European countries, and his report, which contains numerous illustrations of the machinery employed, gives a detailed account of the methods of manufacturing air-dried and other forms of peat fuel, as well as of peat moss litter and other peat products.

Cider in France.—The *Journal Officiel* of December 30th, 1908, gives the total production of cider in France last year as 371,200,000 gallons. The production varies greatly, that of 1907 being only 60,300,000 gallons, the lowest for ten years, while the highest during that period was in 1904, 792,000,000 gallons.

International Cold Storage Association.—As an outcome of the recent Congress of the Cold Storage Industries, an International Cold Storage Association (*Association Internationale du Froid*) has been formed, with its headquarters in Paris. The objects of the Association are generally to promote the progress of the refrigerating industries and to act as a centre for the discussion of matters relating to it. It will arrange for the holding of International Congresses, and endeavour to secure the carrying out of their recommendations. The publication of a Bulletin and the formation of a Library is contemplated. The subscription for ordinary members is 20 francs.

OFFICIAL CIRCULARS AND NOTICES

The attention of sellers of insecticides, fungicides, sheep dips, and weed-killers, which are poisonous by reason of their containing arsenic, tobacco, or the alkaloids of tobacco, is drawn

Poisons and Pharmacy Act, 1908. to the provisions of the Poisons and Pharmacy Act, 1908 (8 Edw. 7, c. 55), with respect to the sale of such preparations by persons duly licensed by the Local Authority: *i.e.* the council of any municipal borough in England having a population of more than 10,000 according to the last published census for the time being, the town council of any royal parliamentary or police burgh in Scotland, and, as respects any other place, the council of the county.

Provisions as to the Sale of Poisonous Substances to be used exclusively in Agriculture or Horticulture.—Section 2 of the new Act provides that "so much of the Pharmacy Act, 1868, as makes it an offence for any person to sell or keep open shop for the sale of poisons, unless he is a duly registered pharmaceutical chemist or chemist and druggist, and conforms to regulations made under Section 1 of that Act, shall not apply in the case of poisonous substances to be used exclusively in agriculture or horticulture for the destruction of insects, fungi, or bacteria, or as sheep dips or weed killers which are poisonous by reason of their containing arsenic, tobacco, or the alkaloids of

tobacco, if the person so selling or keeping open shop is duly licensed for the purpose under this section by a local authority, and conforms to any regulations as to the keeping, transporting, and selling of poisons made under this section," but the section is not to exempt any person so licensed from the requirements of any other provision of the Pharmacy Act, 1868, or of the Arsenic Act, 1851, relating to poisons.

It is further provided that His Majesty may, by Order in Council, make regulations for the purpose of carrying this section into effect, and the following Regulations have been made by Order in Council, dated the 2nd day of April, 1909:—

1. A licence shall not be granted to any person unless the local authority are satisfied that he is fit to be entrusted with the sale of the poisonous substances.

2. In granting licences for the sale of poisonous substances for use exclusively in horticulture, preference shall be given to nurserymen, florists, seedsmen, and other persons whose business is specially connected with horticulture.

3. Applications for licences shall be in the form set forth in Schedule A. to these regulations.

4. Before sending an application for a licence to the local authority the applicant shall publish notice of his intention to apply in two newspapers circulating in the district of the local authority, and shall also send notice by registered post to the Chief Officer of Police of the Police area within which his premises are situate.

5. A licence shall not be granted until after the expiration of at least fourteen days from the receipt of the application by the local authority, and the local authority before granting a licence shall take into consideration whether in the neighbourhood where the applicant for the licence carries on or intends to carry on business the reasonable requirements of the public with respect to the purchase of poisonous substances are satisfied, and also any objections they may have received from the Chief Officer of Police or from any existing vendors of the substances to which the application relates.

6. A licence shall be in the form set forth in Schedule B. to these regulations.

7. A licence shall expire on such day in the year as the local authority fix, but may, on application being made in the form set forth in Schedule C. to these regulations, be renewed from time to time for one year at a time, subject to the same provisions as in the case of the grant of a licence, except that it shall not be necessary to publish or give to the Chief Officer of Police notice of the application. The renewal of a licence shall be in the form set forth in Schedule D. to these regulations.

8. A licence may be revoked or suspended for such term as the local authority think fit, if the local authority are satisfied that the licensee has failed to comply with the requirements of these regulations or of the Poisons Acts, or that the licensee is not a fit person to be entrusted with the sale of poisons.

9. A licensee shall, on being required to do so by any officer of the local authority or any police officer, produce his licence, and any renewal thereof.

10. The fees charged in respect of the grant and renewal of a licence

shall be such as the local authority may determine, not exceeding in the case of the grant of a licence, 10s. 6d., and in the case of the renewal of a licence, 1s. 6d.

11. A licence shall not authorise the licensee to sell or keep open shop for the sale of poisonous substances except from or on premises (to be specified in the licence) within the area of the local authority which granted it, and for the purpose of these regulations a municipal borough the council of which is a local authority for those purposes, and in Scotland a police burgh, shall not be treated as forming part of any county.

12. Every local authority shall keep a register of the licences granted by them for the time being in force, and any person shall, at all reasonable times, upon payment of such reasonable fees as may be fixed by the local authority, be entitled to inspect and to make copies of, or take extracts from, the register.

13. All poisonous substances shall be kept in a separate drawer or closed receptacle apart from any other goods, and poisonous substances shall not be sold upon the same premises as articles of food for human consumption unless the Local Authority are satisfied that convenient arrangements for their sale cannot otherwise be made, and in that case they must be sold at a separate counter. For the purpose of this regulation a part of a counter which is shown to the satisfaction of the Local Authority to be adequately separated from the rest of the counter shall be treated as a separate counter.

14. A poisonous substance shall not be sold except in an enclosed vessel or receptacle as received from the manufacturer, distinctly labelled with the name of the substance and the word "Poison," and with the name and address of the seller, and with a notice of the special purpose for which it has been prepared.

15. Liquid preparations shall be sold only in bottles, tins, drums, or casks of sufficient strength to bear the ordinary risk of transit without leakage. Each bottle, tin, drum, or cask shall have the word "Poisonous" indelibly printed, marked, or branded in easily legible characters in a conspicuous position apart from the label, and the label must bear the word "Poison." When sold in bottles the bottles shall be of a distinctive character so as to be easily distinguishable by touch from ordinary bottles.

16. Solid preparations shall be securely packed in such a manner as to avoid, so far as possible, the risk of breaking or leakage during transport, and the package shall have indelibly printed, marked, or branded in easily legible characters in a conspicuous position notice that it must not be used for any other purpose.

17. All premises from or on which a licensee is authorised to sell or keep open shop for the sale of poisonous substances shall at all reasonable times be open to inspection by officers appointed by a local authority.

18. For the purposes of these regulations the expression "poisonous substances" means the poisonous substances to which Section 2 of the Poisons and Pharmacy Act, 1908, applies for the time being, and the expressions "chief officer of police" and "police area" have in England and Scotland the same meanings as in the Police Act, 1890, and the Police (Scotland) Act, 1890, respectively.

Schedule A. to these regulations sets out the Form of Application for a Licence, and Schedule B. gives the Form of Licence to be used. On the back of this Licence, Sections 1, 2, 3, and 4 of the Arsenic Act, 1851, and Section 17 of the Pharmacy Act, 1868, are to be printed. Schedule C. is the Form of Application for Renewal of Licence, and Schedule D. is the Form of Renewal of Licence.

Carbolic Acid Preparations.—The Poisons and Pharmacy Act makes no change in the position of carbolic acid preparations.

Preparations of carbolic acid for use as sheep wash or for any other purpose in connection with agriculture or horticulture, contained in a closed vessel distinctly labelled with the word "Poisonous," the name and address of the seller, and a notice of the special purposes for which the preparations are intended, are excluded from Part II. of the Schedule to the Act, and may consequently be sold by persons other than pharmaceutical chemists.

The Vice-President of the Department of Agriculture and Technical Instruction for Ireland, by a minute dated April 23rd, 1909, has appointed a Departmental Committee to inquire

Departmental Committee on Dairying. into and interpret the principal forms of trade description (as defined by Section 3 of the Merchandise Marks Act, 1887) at present applied, in the United Kingdom, to different grades of butter, and to suggest what additional measures, if any, it is desirable for the department to take in the interests of the Irish butter industry, with special reference to the prevention of loss or injury to the industry from the use of false trade descriptions.

The Committee will consist of J. R. Campbell, Esq., B.Sc., Assistant Secretary, Department of Agriculture, Ireland (Chairman); Professor T. Carroll, M.R.I.A., Agricultural Inspector, Department of Agriculture, Ireland; E. G. Haygarth Brown, Esq., Superintending Inspector, Board of Agriculture and Fisheries; Right Hon. the Earl of Carrick, Inspector for Irish Produce in Great Britain, Department of Agriculture, Ireland; A. Poole Wilson, Esq., Inspector of Dairying, Department of Agriculture, Ireland. Mr. D. J. McGrath is appointed Secretary to the Committee.

During the four months from June to September the Meteorological Office will, as in past years, supply forecasts of weather by telegraph to persons desirous of receiving them, upon

Harvest Weather Forecasts.

payment of the cost of the telegrams. The forecast will contain twelve words, and the cost will be 6d., with $\frac{1}{2}$ d. for each word in the address. These forecasts are despatched at 2.30 p.m. each day, and refer to the probable weather of the 24 hours commencing with midnight of the day of issue; but forecasts are also prepared at other hours, and can be sent in lieu of the afternoon telegrams on payment of 1s. 6d. per week in addition to the cost of the telegrams.

Applications for the forecasts should be sent to the Director, Meteorological Office, 63 Victoria Street, London, S.W., with a cheque or postal order to cover the cost of the telegrams for the period, which

should be not less than six consecutive days, during which the forecasts are to be sent.

The office is also prepared to send notification by telegram when the conditions appear favourable for a spell of settled fine weather. The notification will take the form of a forecast covering a period of not less than two days following date of issue. Those who wish this notification must deposit a fee of 2s. 6d., which includes cost of telegram.

SUMMARY OF AGRICULTURAL EXPERIMENTS.*

EXPERIMENTS WITH CEREALS.

Continuous Growing of Wheat, 1908 (Journal of Roy. Agric. Soc., Vol. 69, 1908).—After 30 years' continuous experimenting with wheat and barley (1877–1906) at Woburn, certain changes in the plan of manuring were introduced in 1907, and the effect was expected to be manifested for the first time in 1908. One plot received 5 tons 13 cwt. farmyard manure per acre, this being the equivalent of 100 lb. ammonia per acre, and other plots received various mineral manures. "Square Head's Master" was drilled at the rate of 2½ bus. per acre. One plot received rape-dust (=25 lb. ammonia) on February 21st, and nitrogenous top-dressings were given to various plots in early May and early June. The wheat came into ear by June 19th, and most was cut on August 11th, all being carted and stacked by August 26th.

On the whole, the wheat yield was a good one, the unmanured produce being 12½ bus. per acre, or nearly 2 bus. above the average of the last 10 years. The highest yield (28½ bus.) was with minerals (superphosphate, 3 cwt., and sulphate of potash, ½ cwt.) and 2 cwt. per acre (practically) of nitrate of soda, the same minerals and 1 cwt. nitrate of soda yielding 2'3 bus. less. Farmyard manure produced 24'3 bus., but rape-dust (4 cwt. per acre) only 16'6 bus. The 4 cwt. of rape-dust was apparently not equal in effect to 1 cwt. of nitrate of soda, which supplied the same amount of ammonia, the latter yielding 23'7 bus. So far the presence of phosphates appears to be more essential than that of potash, but the evidence is not yet conclusive. Sulphate of ammonia alone gave no crop beyond a little tail corn, but with varying quantities of lime applied some years previously—5 cwt. in 1905, 2 tons in 1897, and 2 tons in 1905—the crops were respectively 3 bus., 22'9 bus., and 18'7 bus. Where a heavy dressing of sulphate of ammonia was used with minerals, the yield was insignificant where no lime was given. The report states that "it is becoming increasingly clear that heavy dressings of sulphate of ammonia when continuously applied will 'run land out' where lime is deficient, even when mineral manures are applied, and that the true remedy is liming." There are, further, indications that ½ ton per acre of lime is not sufficient, but that at least 1 ton per acre should be used.

Continuous Growing of Barley, 1908 (Journal of Roy. Agric. Soc., Vol. 69, 1908).—Similar experiments to the foregoing have been tried at Woburn with barley. In 1908 "Chevalier" barley was drilled on

* The Board would be glad to receive for inclusion in this summary copies of reports on inquiries, whether carried out by agricultural colleges, societies, or private persons.

March 24th at the rate of $2\frac{1}{2}$ bus. per acre. April was a wet and cold month, and the barley suffered a good deal, especially on the weaker plots, and the crop never really recovered from the check. With the sulphate of ammonia plots the need of lime was more emphasised than in the case of the wheat. It would seem clear that the barley crop, being a "surface feeder," feels more quickly the withdrawal of lime and the injurious effects of soil-acidity. After much difficulty in harvesting owing to wet weather at the end of August, the crop was stacked. The yield was very poor, and the grain practically spoiled as regards quality. The highest yield was $24\frac{1}{4}$ bus. with farmyard manure (equal to 100 lb. ammonia per acre), and of the artificial fertilisers, minerals and nitrate of soda gave the best crop.

Varieties of Oats (Dorset C.C. Educ. Comm., Rept. on Agric. Expts., 1907-8).—Ten varieties of wheat were grown on four farms, together with a "local" variety in each instance. With one exception (Garton's White Pearl), all yielded an average of over 35 bus. per acre. The best yields were Garton's Red King, $48\frac{3}{4}$ bus.; Webb's New Standard Red, $47\frac{1}{2}$ bus.; and Toogood's Square-Headed Success, $47\frac{1}{2}$ bus. On one farm or other each of the first three yielded over 55 bus.

Varieties of Oats (Dorset C.C. Educ. Comm., Rept. on Agric. Expts., 1907-8).—Varieties of oats were tested at two centres in 1906, and at two centres in 1907. In the former year no variety reached an average of 50 bus. per acre, the two best being Mounted Police, $49\frac{1}{2}$ bus., and Banner, 49 bus. In 1907 the general level was much better, the best yields being Banner, $64\frac{3}{4}$ bus.; Awnless Probstei, 62 bus.; Besseler's Prolific, $61\frac{1}{2}$ bus.; and Mounted Police, $57\frac{1}{2}$ bus. The seed oats were procured from the West of Scotland Agricultural College, and it was the aim to sow each variety at the same rate, i.e., $2\frac{1}{2}$ million seeds per acre.

Effect of Change of Seed Oats (Univ. Coll. of N. Wales, Bangor, Agric. Dept., Bull. IV., 1908).—In 1905 seed oats were obtained from ten different districts in the British Isles, and tested with seed grown on the farm at Madryn for the previous three years, with the object of ascertaining to what extent growth may be affected by seed produced in different situations under varying conditions. The experiment was repeated in 1907 and 1908, the variety in all three years being Abundance. The experiment, which will be continued for another year, so far appears to show that no advantage is gained by changing seed in cases where home-grown seed, well dressed and of good quality, can be obtained. Fresh seed did not appear to tend to an earlier harvest, all plots ripening at practically the same time.

Varieties of Oats.—(*West of Scotland Agric. Coll. Bull. 45. Report on Experiments on Varieties of Oats. Frame Experiments and Frame Crops.*)—An extensive series of experiments has been carried out over a number of years by the West of Scotland Agricultural College, under the direction of Prof. M'Alpine, in regard to varieties of oats, their botanical characters, and the influence of manures thereon. The experiments dealt with in Bull. 41 were referred to in this *Journal*, September, 1908, p. 461. The experiments, which are of a very detailed character, do not lend themselves easily to condensation, but the following summary will give an indication of the main points.

The investigations in this section were carried out in the following

way: Thirty-two oat seeds were sown at the same distance apart, under the same conditions, and at the same rate per acre as the seeds for a field crop, with the idea that a detailed examination of the matured produce of these 32 seeds would not only make plain the characteristics of the oat, but also throw light on the peculiarities displayed by the corresponding field crop grown alongside. These 32 seeds were enclosed in a bottomless iron frame fixed in the ground level with the surface. During 1905, 429 of these "frame experiments" were carried out on 33 farms with 27 varieties of oats. The results show that mortality in the grain-producing varieties is naturally high, but naturally low in the case of the straw-producing Scotch oats. The grain-producing varieties are quickest of growth in early life, and are more affected by sudden changes in moisture or in temperature than the more backward, and therefore hardier, Scotch varieties. On soils that foster rapid growth, whether from manuring or other causes, the dangers from sudden changes are intensified. This action of the soil could be traced in the varying rates of mortality on different farms, being very high on some farms (30 to 47 per cent.), on others very low (3 to 9 per cent.), and although one variety of oat is more hardy than another, the unfavourable action of the conditions on certain farms is marked by a higher mortality of all the varieties grown there. The average mortality in 1905 of some of the varieties was as follows:—Potato, 9 per cent.; Sandy, 14 per cent.; Tartar or Storm King, 16 per cent.; and Waverley, 11 per cent. These figures were lower than those obtained in 1900.

In the same way as with the mortality, the tillering power varies with the variety and with the farm. Generally speaking, it was increased by appropriate manuring. The average results in 1905 showed that 162 shoots were produced per 100 plants, while Sandy produce 206, Potato 162, Waverley and Tartar King each 130.

As regards the proportion of mature straws to barren shoots, the average result for all the farms showed that four-fifths of the total number of shoots became mature straws, and one-fifth remained immature and more or less grass-like.

Another point investigated was the straw length for different varieties. The average taken from maximum straws, measured from 3 inches above the ground to the tip of the ear, was 40 inches. Certain varieties were much more influenced by manure than others, Sandy and Banner showing little difference, whereas in Danish Island and Wide-awake an increase of 4 to 10 inches in length was obtained by manuring. The effect of environment was decidedly marked, the same variety giving long straws on some farms and very short straws on other farms. Another influence is that of season, the length in 1905 being less than in 1900.

The bore of the straw was also determined, and it is remarked that the noteworthy point is that bore and length increase together in certain varieties, and this characteristic enables the oat grower to apply manures freely in these cases without increasing the danger of "lodging," whereas varieties such as Sandy cannot stand heavy manurial applications, because the bore and the standing power do not keep pace with the change in the straw and ear.

The old varieties, such as Potato and Sandy, are longer-eared and

bear a greater number of spikelets than the new varieties, but although Sandy and Potato excel in this respect (having 50 to 70 spikelets), there is often poverty of grain within the spikelets and low weight of individual grains—matters capable of considerable improvement by means of careful selection, attention to pedigree, and, above all, by securing and sowing the best seed.

Among the grain-producing varieties, Banner and Mounted Police have about 40 spikelets to the ear, usually well filled with heavy corn. Some of the varieties, such as Danish Island and Wide-awake, vary from 22 to 37.

Varieties of Oats.—(*West of Scotland Agric. Coll. Bull. 46. Report on Experiments on Varieties of Oats, 1902-7, Section III., Dressed Grain.*).—This section of the report on varieties of oats deals exclusively with dressed grain. From an examination of the weight of 1,000 seeds of different varieties, it appears that they may be divided into two classes, one marked by low, and the other by high, comparative weight. These varieties may for convenience be called small and large oats, the former being the well-known Scotch oats, or straw-producing kinds, of which the best known examples are Sandy and Potato, the large oats being the grain producing sorts, such as Banner and Waverley.

When this difference in size is realised, it will be understood that a bushel will contain very different numbers of seeds, and that some calculation is necessary to ensure that the different kinds are sown at the same rate. This is not represented by the same number of bushels, nor the same number of pounds, but by that number of pounds which corresponds to 3,000,000 seeds, this being the ordinary number of seeds required per acre. A number of tables are given showing that high weight per bushel is not a reliable indication of heavy individual seeds, and in order to make certain of heavy corn the only simple plan is to weigh a counted number of seeds. A high weight of seeds, however, does not always imply that they formed part of a heavy crop, although one mark of good seed oats is undoubtedly high weight per 1,000 seeds, for this character is often intimately connected with the best crops. On the other hand, these investigations clearly showed that in some cases the heaviest seed may come from the poorest crop. This heaviness, however, is not of the proper sort; it is the kind that comes from poverty-stricken ears rather than from ears prolific of grain; careful examination enables the two kinds to be distinguished. Fortunately, the prolific ear develops the grains in pairs, and, in certain varieties, even in triplets; whereas the stunted ear develops the grains singly, and there are no "bosom pickles," none of the small grains which mark the prolific ear. The heavy grains borne by stunted ears have, therefore, at the end of the stalk on the inner face, a tiny white rudiment, which must be absent from the corresponding seeds of prolific ears, since there the rudiment has ceased to be a rudiment, and has become transformed into a second grain or "bosom pickle."

The corns from prolific ears are not of uniform size, since the "second" or "bosom pickle" is smaller than the larger grain with which it is associated. Accordingly, the end of the stalk of the large seed bears no rudiment, but a scar left by the detachment of the "bosom

pickle." The corns from prolific ears may be made of uniform size by sifting out the small pickles; but, by this sifting process, the seed has not been improved for sowing purposes, although the weight per bushel is increased, and the weight of 1,000 seeds also. The very best crops of oats may be got by seeding with small pickles and tailings, the reason being that this seed is the offspring of those prolific ears which produced the pickles in pairs.

In buying oats, therefore, for seed purposes, the uniformity of the sample, the appearance of the husk, the dressing of the grain, and a heavy weight per bushel are no guarantee of high quality, there must also be the certainty that the seeds have come from prolific ears, and for this purpose the stalk on the individual corns must be examined to see whether a sufficient number of these lack the rudiment. In addition, a proper weight per 1,000 seeds is desirable, and the tables given afford a guide on this point.

Varieties of Oats. (*West of Scotland Agric. Coll. Bull.* 47. *Report on Experiments on Varieties of Oats, 1902-7. Section IV., Dressed Grain and Meal Power.*).—This Bulletin deals with (1) kernels of dressed grain, and (2) proportion of kernel to husk and meal power.

The first point investigated is the average weight of kernels per 1,000, and the want of connection between the average weight of the kernels per 1,000 and the weight of the corn per bushel is pointed out. The maximum and minimum weight of 1,000 kernels and the influence of manure on kernel weight are considered. Various factors in connection with the proportion of kernel to husk are dealt with, and the average weight of oatmeal yielded by equal weights of dressed grain from each of 26 varieties is given.

Varieties of Oats. (*Univ. Coll., Reading. Results of Experiments at College Farm, 1908.*).—Siberian and Wide-awake were tested in 1908, and gave yields of 6 qr. 3 bus. and 6 qr. respectively. (*Journal*, September, 1908, p. 561.)

Black Tartarian Oats. (*Journal of Irish Dept. of Agric., October, 1908.*).—The price of Black Tartarian oats for seed depends largely on the colour of the seed. Jet black seed is more valuable than seed which is brown or mahogany in colour, and the main reason advanced in favour of such a practice is the hope that the colour of the produce may be influenced by the character of the seed. Five experiments were carried out at different stations, which seem to show that the colour depends far more on soil, climate, and local conditions than upon the colour of the seed sown. It is generally believed that heavy cold soils will produce blacker oats than warm, sandy soils, and that a better colour is obtained when black oats are sown after potatoes or roots than after grass.

COLONIAL AND FOREIGN EXPERIMENTS.

Experiments with various Nitrogenous Manures. (*Arbeiten der Deutschen Land. Gesell., Heft 146.*).—This Report by Prof. Schneidewind, Director of the Experiment Station at Halle, covers numerous pot and field experiments carried out in 1905-7 with various crops. The field trials were carried out with rye, wheat, barley, potatoes, and sugar beet, the manures tested being nitrate of soda, sulphate of

ammonia, Norwegian nitrate of lime, calcium cyanamide, and lime nitrogen. The results are given in detail, and are discussed under several heads:—(1) The increased yields due to different forms of nitrogen; (2) the quantities of nitrogen taken up by the crops from each kind of manure applied; (3) a comparison of the increase in crops with the utilisation of nitrogen; (4) the effect of application in autumn and spring; (5) the effect of top dressing spring crops; and (6) the influence of nitrogen on the starch and sugar content of potatoes and roots.

It is considered that nitrate of soda has given the best average results, while the relation of sulphate of ammonia to nitrate of soda was as 90 : 100. The Norwegian nitrate of lime acted on the average in exactly the same way as nitrate of soda. In the field experiments the increase in the crops was 96 as compared with 100 for nitrate of soda. In experiments with grain, however, its action was somewhat inferior, but further trials will be necessary to ascertain whether this is regularly the case. Calcium cyanamide has not given satisfactory results on sandy soils or sandy loams, but on heavier soils it has come up to expectations except as regards roots.

. In the case of autumn-sown grain (rye and wheat) the highest yields were obtained when all the nitrogen was applied in the form of a top dressing of nitrate of soda in spring. No great difference was observed on the heavier soils between the effect of nitrate applied in the spring and sulphate of ammonia applied in the autumn, but in the case of light soils the difference was very great, as under certain circumstances nearly the whole of the manure may be lost during the winter. These manures should therefore only be applied in autumn where it is necessary to strengthen the plants for the winter, and even then only on moderately retentive soils, as otherwise it is money thrown away.

Milk Production of Cows. (*Bericht des Deutschen Landwirtschafts-rats, Reichsamt des Innern. Untersuchungen über die Wirkung des Nahrungsfettes auf die Milchproduktion der Kühe.* 1907.).—This Report by Professor Kellner, of the Mockern Agricultural Experiment Station, gives the result of experiments carried out at ten German experiment stations with the assistance of the Ministry of the Interior.

The experiments were carried out under conditions of ordinary farming at each centre with two groups of ten cows each, so selected as to be practically identical as regards yield, quality of milk, and live weight. Both groups were to be fed for one period with food poor in fat, then one group was to receive food rich in fat, and afterwards to revert to the poor food. In some cases, however, the whole number were fed first on poor food, then on rich food, and again on food poor in fat, the choice of the method being left to the experiment station. Each period covered about 30 days.

The results of these experiments may be summarised as follows:—

1. The substitution of a part of the digestible carbo-hydrates in the food of milch cows by an equivalent quantity of digestible fat, not exceeding 1 kilo. of fat per 1,000 kilos. of live weight, has, with the great majority of the animals, somewhat diminished the yield of milk as well as the weight of fat in the milk.

2. In one out of the ten experiments, a small increase in yield

(about 0.19 kilo. per cow per day) took place after feeding with the richer ration, and in three cases the yield changed to an insignificant extent; in these four cases the weight of fat in the milk sank in a marked degree. In another case, a notable diminution in the yield (1.05 kilo. per cow per day) took place, but here there was an increase in the fat (12 grammes per cow per day); this was probably attributable to the fact that a very scanty ration was being fed. In the remaining five cases the yield diminished and also the fat content (with one exception, where it remained unaltered).

3. The fat-content of the milk after the addition of fatty food was sometimes higher and sometimes lower than with the poor ration. With a marked diminution in the quantity of milk, the percentage of fat rose, but with a smaller decrease it fluctuated but little; when the yield remained stationary or rose slightly, the fat-content decreased.

4. Fat supplied in the form of rice-meal changed the character of the butter-fat as measured by the Reichert-Meissl number, &c.

5. The individuality of the cows was very marked, and every variety of effect was produced in single cases by the change in food.

The experiments as a whole agree in their average results in showing that no economic advantage is to be obtained by increasing the fat in the food above the quantity in a standard ration. Apart from exceptional cases, the quantity of fat in the food of milking cows should be kept within moderate limits, and an equivalent amount of carbo-hydrates should be given instead of large quantities of fatty foods. As feeding stuffs rich in carbo-hydrates are generally cheaply produced on the farm, whereas fatty foods can only be obtained by purchase, and as, moreover, combinations of carbo-hydrate foods containing a moderate amount of fat have a better effect on cows than a ration rich in fat, the general tendency of the foregoing experiments is towards cheapness in production.

Manufacture of Tomato Ketchup without Preservatives (U.S. Dept. of Agric., Bureau of Chemistry, Bull. 119).—This bulletin describes the methods of making tomato ketchup on a commercial scale, and gives the results of a number of experiments on the action of preservatives, and the length of time the product will keep under varying conditions of manufacture and temperature. The results showed that ketchup can be made satisfactorily without preservatives. The mould which develops in ketchup is described and illustrated. Tests were made to ascertain the temperature at which its vitality is destroyed.

Effect of Formaldehyde upon Digestion and Health (U.S. Dept. of Agric., Bureau of Chemistry, Circ. 42).—The use of formaldehyde as a preservative in food is usually condemned, but it is stated in this publication that it is still advertised for this purpose in the United States under its own and other names. The results are given of careful experiments conducted in 1904. Twelve healthy men were selected and kept under observation for 35 days; in the first period of 10 days their normal condition was ascertained; in the second period of 15 days the preservative was administered; in the third period of 10 days the after-effects were noted.

The conclusion arrived at by an examination of all the data was that the admixture of formaldehyde with food is injurious to health, even in the case of healthy young men, so that it is probable that in the case of infants and children the deleterious effects would be more

pronounced. Its addition to foods tends to derange metabolism, disturb the normal functions, and produce irritation and undue stimulation of the secretory activities. Its use, therefore, is never justifiable.

Potato Trials in Germany (*Zeit. für Spiritusindustrie, Ergänzungsheft*, 1909).—This publication contains the report of Prof. von Eckenbrecher on the trials carried out by the German potato culture stations in 1908. These experiments, which have been made annually since 1888, are intended to test the value of different varieties of potato. They were carried out in 1908 at 27 different centres distributed throughout Germany. Full particulars are given of the yield of each variety during the past 20 years, together with their starch content and yield, and observations on the prevalence of disease in the past year. The report also contains the results of the tests of 129 varieties made at the seed-testing station at Kloster Hadmersleben.

Experiments with Hot Water as an Insecticide (*Beobachtungen und Versuche betreffend die Reblaus. Arbeit. K. Biol. Anstalt für Land- und Forst-wirtschaft, Band 6, Heft 5*, 1908).—These experiments were carried out for the purpose of testing the value of hot water for the disinfection of vines affected with *Phylloxera vastatrix*. Vines were placed in water at various temperatures and for various periods, and it appeared that immersion in water at a temperature of 140° F. (60° C.) for half an hour killed the insect in all its stages, including the eggs. The same result was obtained when the period of immersion was respectively 10 and 5 minutes, and even when reduced to one minute. A temperature below 115° F., however, was ineffective, and even at temperatures somewhat above this the results were doubtful.

THE POTATO TRADE OF LINCOLNSHIRE IN 1908-9.

H. AMOS.

The disappointment of the season, from an agricultural point of view, has undoubtedly lain in the potato trade. In January, 1908, Up-to-Dates were worth £5 per ton on the London markets, and they rose steadily until May, when they touched £5 10s. and £6, so that growers who had any left to sell in the spring were able to make excellent prices. The advent of the new crop of First Earlies, however, soon brought a reduction, and prices for English produce gradually got to 90s. per ton. Early in August, Puritans and Sharpe's Express were quoted in London at 75s. per ton. By the end of the month they dropped to 60s.-55s., and when Up-to-Dates and Kidneys supplanted them, the latter ruled at the same figure until the end of September, when they fell to 55s., or just over half the May quotations; from the end of September to January 1st, 1909, they never got beyond 65s., and were a very slow trade at that, even with almost perfect samples; from January to the end of March prices in many cases fell as low as 50s. for Up-to-Dates, while for other varieties, such as Royal Kidney, Evergood, Lupitz, Silicieus, and Northern Star, customers have been very hard to find.

Export to America.—During this time several London salesmen have bought large quantities of medium-class produce, such as Royal Kidneys, Evergoods, and Lupitz, at 30s. per ton and upwards, especially in the Lincolnshire and Cambridgeshire districts, for export to

America. Large supplies have also gone from Scotland, and many thousands of tons in all have been sent to America. The expenses on these potatoes are very heavy, viz.: Carriage from Lincolnshire and Cambridgeshire to Tilbury, 8s. 4d. per ton; dock dues, 1s.; freight, 10s.; and duty into America, 38s. 4d. per ton. Bags are unreturnable; this adds 7s. per ton, and commission 10s., not counting the risk of frost and shrinkage. This trade has been of great service to growers, as, although prices have been low, it has helped to clear thousands of tons at 30s. and over, whereas if all had been sent to the London and other markets much lower prices would have resulted, while a good many clamps of potatoes would never have been cleared.

Prevalence of Low Prices.—Nearly all districts where potatoes are grown have suffered this season on account of the bad prices. Crops everywhere were extremely heavy, though in some places "blight" was prevalent, but, speaking generally, the tonnage was greater than has been the case for some years, and it was the general opinion that many hundreds of tons would not be sold by the end of the season. In the Lincolnshire district, where very large quantities of "Ware" are grown, it is many years since potatoes have been so difficult to sell. Most of the counties throughout the United Kingdom where potatoes are grown have been also oversupplied with local produce. During the past month, however, it has been realised that stocks were materially reduced, and buyers, instead of being able to purchase easily a thousand tons of "Ware," find it extremely difficult to find a hundred tons, while growers could now sell any sort at 45s. to 50s. per ton. There is promise, therefore, of a satisfactory finish to a most unsatisfactory season.

Notes on Varieties.—Throughout the season the favourite potato has been the Up-to-Date, and, both in cooking qualities and appearance, it has been hard to beat. Its one great fault is its liability to disease.

The nearest approach to the Up-to-Date is a potato called "The President." It is a good cropper, and grows a fine oval sample with russet skin, and is one of the most disease-resisting potatoes in cultivation. It was raised in Holland in 1901 from two German varieties. Until now this potato has mainly been grown on peat and sand, but in the spring of 1907 a few were planted in clay or loam with success. It is said that those farmers who tried them intend to replant the whole of last season's growth. It appears to be one of the safest varieties to grow, and it is certainly a long way in front of Evergood and Royal Kidney, both in crop and quality, and is quite as free from disease. It has the vigour and quality of the Up-to-Date, and is equally good in sample. I have seen several excellent crops in the district of Chatteris and Ramsey St. Mary, which were an excellent sample, and sold very freely.

One very seldom hears much of the old Garton, which years ago was a prime favourite. Very few are grown nowadays, though there are a few districts where it is favoured, such as the Thorney estate. In one part of the estate, Gartons are grown with excellent results. It is, however, a variety that does not suit every place.

Various districts have their own favourite potato; for example, the Doncaster and Goole districts prefer "King Edward VII." before anything else, and large crops are grown there on the warp lands.

Among First Earlies may be mentioned "Duke of York," which is

not an abundant cropper, but is one of the best First Earlies in appearance and cooking qualities, and is also a useful potato to keep for seed. Myatts are suitable for those who like a close, yellow-fleshed variety, while Snowdrops or Sharpe's Express represent floury varieties. May Queen, Epicure, Early Eclipse, Sharpe's Victor, Midlothian Early, Dalmeny Early, and Sir John Llewellyn are other First Earlies worth trying.

Among Second Earlies the last-named variety is one of the most useful, and is a general favourite with the public. The tubers are of splendid shape, and it is a heavy cropper. British Queen is another white kidney worthy of highest praise, a good cropper and also cooker, although after Christmas it begins to lose its quality, and is inclined to cook a dark colour, thus spoiling it as a best table variety. Royal Kidney has certainly earned a reputation as a disease-resister, and has set up cropping records in all districts; its cooking qualities, however, are not of the best.

As regards the Late Varieties, the Factor was placed at the head of popular varieties, and it is a very good quality potato as regards cooking and cropping.

Duchess of Cornwall is not grown extensively in Lincolnshire, and is sold at very low prices. Other really useful sorts include Scottish Triumph, Dalmeny Beauty, Northern Star, Dalmeny Hero, Eldorado, Langworthy, King Edward VII., Table Talk, and, last of all, the Up-to-Date, which is still and has always been one of the best maincrop varieties where the soil and situation suit it.

If one attempts to make a selection from the varieties named, my choice for the three First Earlies would be Duke of York, Sharpe's Express, Epicure; for three Second Earlies, Sir John Llewellyn, British Queen, Royal Kidney; and for six maincrop varieties, Factor, Up-to-Date, King Edward VII., Northern Star, Eldorado, Dalmeny Beauty. The three best varieties for flavour are probably Up-to-Date, Snowdrop, and Langworthy.

THE CORN MARKETS IN APRIL.

C. KAINS-JACKSON.

The scarcity of British wheat, which was anticipated after Easter, as a result of the large deliveries earlier in the season, has become a fact, and has brought about a striking advance in quotations, while important market operations in the United States have caused a startling series of fluctuations in the price of American breadstuffs. These fluctuations have affected our port markets rather seriously, but this has not been due so much to speculation in Great Britain as to the April stock returns disclosing a dangerous depletion in the granary reserves of imported wheat. Outside the wheat trade there has been a material advance in maize prices, the direct result of spot scarcity, and there has also been an appreciable advance in oats. This latter rise may be assigned to three different causes—the increased appreciation of Argentine produce at previous low prices, the good demand for English for seed, and a larger retail use due to the difficulty in obtaining maize. Probably all three causes have contributed to the effect which, under the circumstances, may be described as moderate,

Wheat.—The average price of British wheat has risen at some of the markets to a forty-six shilling level, and the average for the whole country at the end of April was well above forty shillings. The highest prices were made, as a rule, in the Thames Valley, at Mark Lane, in the home counties, and in East Anglia; but in the last-named and very important district there was some irregularity, Norwich and Peterborough, for example, differing on the 17th by 2s. 10d. per quarter. The markets of the west and north have been slower in advance than those of the south and east. The price making in London during the last week of March for sound red wheat was about 36s., and similar samples during the last few days of April sold for 43s. per qr. This is not only a material difference in itself, but, as representing sales for the 26th to the 30th, it allows for the effect of reaction consequent on the fall on the American markets on the 22nd, 23rd, and 24th. Just before that fall, viz., on the 19th, 20th, and 21st insts., 46s. to 47s. was asked, and 45s. was made without difficulty. Supplies into London, however, were very moderate, and in the week ended 20th, only 1097 qr. were sold, despite a strong and urgent inquiry on the part of millers. The country markets show a genuine character to attach to the dearthness of home-grown wheat. In the week ended 24th, deliveries were only 25,679 qr., against 32,534 qr. in the corresponding week of 1908. Yet the price was 10s. 6d. up, on the year, as powerful an incentive to sell as recent seasons have disclosed. For the 34 completed weeks of the season this cereal year's average was practically identical with that for 1907-8, but for 35 completed weeks, which includes one day in May, the current year's average draws fractionally ahead of the previous cereal year. Farmers' holdings of old wheat are currently estimated at a very low total, and the small remainder of the 1908 crop is apparently assured of a brisk demand for mixing.

The American wheat, which at the end of March commanded 42s. 9d. per qr. at New York, rose steadily till, on April 17th, it stood at 48s. 9d. Then there followed a week of those excited operations which are peculiar to the United States, and before April was over the market had settled down to a spot price of about 44s. per qr. The Mark Lane reflection of these events may be briefly set forth: No. 1 Northern Manitoba wheat, March 31st, 44s. 6d. per qr.; April 7th, 46s. 3d.; April 14th, 48s.; April 21st, 48s. 6d.; and April 30th, 47s. per qr.

With respect to foreign sorts of wheat other than American, these movements followed on the price changes in British and American, but were less marked by fluctuation. At the end of the month Argentine was making 45s., Australian 44s. 6d., fine Russian Azima 45s., and Odessa Ghirka 44s. per qr., while new Indian wheat was just coming into evidence at 44s. per qr. The Indian, however, was confined to parcel post samples, and no appreciable bulk can reach us for a month to come.

The statistical position of the international wheat trade has not changed in buyers' favour, the reaction since the 24th being simply in the nature of a rebate off previous excess in advance. The imports and deliveries of the month did not exceed requirements, while the supply on passage fell from 4,215,000 qr. to 3,244,000 qr. This is a material difference, and is bound to exert an influence over the trade of the next few weeks. Wheat shipments for April were 390,000 qr. from

North America, 1,703,000 qr. from South America, 545,000 qr. from Russia, 79,000 qr. from Roumania, 70,000 qr. from India, and 475,000 qr. from Australasia. Despite an important net advance in prices, and the establishment of a thoroughly remunerative level, every one of these countries except India sent off less wheat in April than in March. The five countries (all save India) despatched in March 4,846,000 qr., in April 3,192,000 qr., and, to meet this striking deficiency of 1,654,000 qr. India only sent 70,000 qr. A net falling off of 1,584,000 qr. has, therefore, to be recorded. The chances of cheap wheat in Great Britain during the remaining weeks of the cereal year to August 31st would appear to be slight.

Flour.—The flour market has developed no original movement, but has followed in the wake of wheat. London has continued to be rather well supplied with country flour containing a large admixture of English wheat. It will be worth noting how long this good supply, mainly from East Anglia, continues, now that English wheat locally has become both scarce and dear. The top price has advanced 3s. on the month, from 36s. to 39s. per sack. Town Whites and Town Households have each advanced by a like sum; Household flour now stands at 34s. per sack. What is called a "good suburban loaf," made half of Town Whites and half of Town Households, would cost 35s. 6d. per sack, a price which, according to the ordinary reckonings, would warrant a charge of 6d. for the quartern loaf. There is a frequent charge of 6½d., which was fully justified during the brief period of highest prices, but does not now seem to be requisite. The prices of American flour include 35s. for the best produce of the famous north western mills, and 30s. for Iron Duke. The latter shows 2s. 6d. net advance on the month. North America during April shipped only 331,000 sacks, and there were on the 30th only 140,000 sacks on passage, against 180,000 a month previously, and average expectations of not less than a quarter of a million sacks.

Barley.—There has been a very small sale of malting and brewing barley during the past month, but a few good malting samples at Mark Lane have fetched 34s. to 35s. for Californian, and 35s. to 36s. for English. Feeding barley has sold steadily at 26s. to 27s. for "bold" English, 23s. or thereabouts for Russian, Indian, and Persian. Prices did not gain much in firmness from the strength of other staples, for, as Russian shipments for April were 1,175,000 qr., a considerable quantity, the impression created was one of approaching good supply. There may, however, be some change in this respect shortly, for the actual receipts from abroad up to the end of the month proved to have been below the average, and the quantity on passage, 300,000 qr., was decidedly small, perhaps 40 per cent. below the mean. The Continental purchasing of the Russian exportation must have been large and sustained.

Oats.—Before the close of April there were markets quoting British produce at an average price of over a sovereign per quarter. Among these it will suffice to name such prominent trade centres as Mark Lane, Cambridge, Peterborough, and Reading. During the month Argentina sent off 455,000 qr., and Russia 700,000 qr., but the demand for light oats at low prices rose steadily, and the advance on the month from the lowest rates of March was as much as eighteen pence per

quarter. The inquiry for seed oats was brisk from the 5th to 19th of the month, and many are of opinion that over an average area has been sown. The market at present is poorly supplied with New Zealand and other heavy oats from overseas, and this despite the excellent prices which the exchanges are quoting. At the end of April ordinary Mark Lane prices were: Scots Oats, 21s. to 23s.; English, 19s. to 21s.; Russian, 17s. 6d. to 18s.; and Argentine, 17s. 3d. to 17s. 6d. per quarter.

Maize.—Imports probably were little above a moiety of requirements, and the supply on passage at the end of the month was at least 20 per cent. below the average. Holders, therefore, had progressively the best of the situation, and there was nothing in the month's shipments to stop an advancing market. North America sent off 467,000 qr., South America 195,000 qr., Russia 338,000 qr., and Roumania 298,000 qr., but the demand from the buying countries could probably have taken fully two million quarters. Prices at the end of April were distinctly high, say 31s. per qr. for American, 32s. for Russian, 35s. for Argentine, and 36s. for Natal. These prices for prompt delivery of the actual grain were in sharp contrast to the free offers to ship new crop Argentine in June at 5s. 5d. per cential (26s. per qr.).

Pulse.—British beans of the 1907 crop are still available, but, of course, in very small quantities only; 37s. per 512 lb. is about the price. Beans of the 1908 crop command 35s. per qr. The arrival of nearly 25,000 qr. of beans from Manchuria on the 26th was an event of the London trade. The price of these beans varies from 30s. to 34s. per qr., and their feeding value is high. Peas have been making 37s. for Maples, 35s. 6d. for Dun, English, and for the imported descriptions 34s. (Chinese), 38s. (Canadian), 93s. (Indian White), and 45s. (New Zealand). Sorghum at 25s. to 26s. per 480 lb. is cheap, but Dari at 30s. to 36s. for the same weight is not a very good bargain.

Oilseeds.—India is reported to have a fair crop of linseed, certainly a material improvement on the poor yield of 1908. The price asked, 43s. per 410 lb. or thereabouts is not low. Argentina is shipping steadily at 42s. 6d. per 416 lb., always keeping as far as may be just "to the good" of India, a sixpence less money for a trifle the heavier quarter. Rapeseed is decidedly cheaper on the month, 41s. commanding fair Indian. Cottonseed at the end of March was worth about £7 10s. per ton. This price, as was remarked last month, "soon brings in buyers from different quarters." The past few weeks have seen the result of this in a steadily increasing inquiry, and a closing price for April 30th of £8 cash. There is a small but steady sale for poppyseed at 49s. to 50s. per quarter.

Farm Seeds.—Business from the 1st to the 19th was dull, but a fairly active period succeeded. Prices ruling at the end of the month were 62s. for the best English red cloverseed, 46s. for good, 72s. for cow-grass, 61s. for the best English white cloverseed, 84s. for alsyke, 30s. for fine trefoil, 48s. for suckling clover, and 77s. for Lucerne; all per cwt. Canaryseed made 38s. per 464 lb. for Argentine, and was rather dearer on the month.

Minor Staples.—Poultry mixtures have risen with the increase in the cost of their main ingredients. A good mixture now commands fully 22s. 6d. per 336 lb. The best crushed mixtures sold at Mark Lane realised £7 per ton. Some recent rates of pea meal have been at £8 10s.

per ton. Despite the advance of the season and the growth of grass, the by-products of the mill have rather risen in price than declined. At the end of April the finest middlings were held for £7 10s. per ton, pollards fetched £5, and the best broad bran £6 per ton. The good inquiry for meal, in its different grades of fineness, is a decided support to modern milling.

THE LIVE AND DEAD MEAT TRADE IN APRIL.

A. T. MATTHEWS.

Fat Cattle.—The trade for fat cattle throughout the month was again remarkably steady, with only very moderate fluctuations in prices. Supplies have been good, but by no means unduly heavy, and the general quality and condition fully up to the average. Especially has this been the case at the Metropolitan cattle market, where the supply of Norfolk-fed bullocks has been excellent. With regard to this class of cattle, it may be permissible to remark that their good "quality" is, in a very great degree, derived from the first-rate feeding and management bestowed upon them. They are largely composed of Irish shorthorns, decently well bred, but by no means boasting of pedigree or even purity of descent, and the way in which they are turned out by the Norfolk farmers speaks volumes for the skilful handling of such very ordinary raw material as they appear to be when they come over in poor store condition.

The markets in the first week were more or less affected by special supplies for Easter, which largely consist of lamb and veal, and beef suffered a temporary eclipse. In some markets cattle were sparingly offered, and at Darlington, Dorchester, Exeter, Norwich, and Castle Douglas there was a slight decline. On the whole, however, it may be said that the prices prevailing in March were fairly maintained. The average of 26 markets for prime Shorthorns was 8s. 1½d. per 14-lb. stone.

The following week included the Easter holidays, and Easter Monday's market at Islington afforded another instance of the want of appreciation by consignors in the country of the way in which the holiday is regarded in London. No less than 840 head of fat cattle were on offer, and less than half that number would have been ample to meet the requirements of the few butchers present. Some business was done in the early morning at ¾d. per lb. reduction on the previous week, and 7d. per lb. was, according to the ordinary reports, the current top price of the day. Later, however, much lower prices were accepted in order to clear, and many excellent cattle were sacrificed at 6½d. per lb.

That this exceptional absence of buyers was the cause of lower prices is shown by the fact that trade in the country markets was relatively much better than in London. The prices of the week ranged from 8s. 9d. per stone at Basingstoke, to 7s. 9d. at Hull, Lincoln, and Norwich. This is a wide range, but the tone of the country markets as a whole was firm. There was very little change in cattle values in the third week, but, if anything, the tendency was towards improve-

ment, nearly all the recorded markets showing a fractional advance amounting to an average of about $\frac{1}{4}$ d. per 14 lb.

There was again an excellent supply of well-finished shorthorn cattle at Islington on the 26th, but trade ruled slow, and prices would probably have given way had it not been for large buying for the dead-meat market. One firm alone purchased no less than 200 head. This support was the most important feature of the trade, and, of course, had a very steadying effect. According to a circular issued by the Markets Committee of the London Corporation, there exists a very large demand for genuine home-grown produce in the metropolis, and that authority expresses a wish to encourage larger supplies. There has certainly been observable of late a much better attendance of City buyers of cattle at Islington, but whether this really denotes an augmented demand for British beef in preference to foreign it is impossible to say.

The month closed with a steady trade for beef cattle, the best quality of Shorthorns being worth about 7d. per lb.

Fat Sheep.—The slight improvement in the sheep trade at the end of March was by no means general, but during the first week in April there was an unmistakable revival in the demand, and a much more cheerful tone. Taking first quality "Downs" as an example, we find quotations advanced at Basingstoke, Hereford, Ipswich, London, Newcastle, Norwich, Shrewsbury, and Wellington, while there was virtually no record of lower prices at any market, and, almost everywhere, sales were more easily effected. The average price at 17 leading markets for first quality "Downs" in the wool was within a very small fraction of 8d. per lb. Clipped sheep began to be fairly numerous, and sold well in proportion to those in the wool, fetching 7d. per lb. at Hereford and Newcastle.

The adverse effect of the Bank Holiday on the trade for sheep at Islington was quite as marked as on that for cattle. There was quite a large supply of over 5,000 head, and prices declined fully $\frac{1}{4}$ d. per lb. As so large a proportion of the sheep at most markets were shorn, the exact extent of fluctuations was difficult to arrive at, but it seems that a further advance was reported in no less than 17 leading markets, while only four, including London, were quoted lower; it is plain that the general upward movement was continued during the second week. At Nottingham and Preston, some clipped cross-bred hoggets fetched 7 $\frac{1}{4}$ d. per lb. This price was equal to those for woolled sheep only a few weeks before, so that up to this time the improvement may be estimated by the value of the fleece. The advance thus established was continued in the following week, and in every way the trade showed signs of revival. At 28 markets out of 37 there was an upward tendency in values, and most of the remainder were firm, and maintained the advance already established. Clipped Down tegs realised up to 7 $\frac{3}{4}$ d. per lb at Peterborough and Salford, and 7 $\frac{1}{4}$ d. at Leicester. But perhaps the most satisfactory feature was the fact that these enhanced prices were realised in the face of considerably increased supplies, owing to the end of the turnip season and the arrival of the time for clipping. There could scarcely be a stronger proof that demand must have revived very considerably than that an enlarged supply has met with a better trade at increased rates, and that it should have done so throws a somewhat curious light on the causes of the

singular and prolonged depression in the mutton trade during so many months. The supply of turnip-fed tegs virtually ends with the month of April, and thus the present supplies can scarcely be maintained beyond the middle of May. The fine rains and genial growing weather were also greatly in favour of the trade, and the end of April was marked by a restoration of confidence in sheep-farming prospects. The trade at Islington scarcely kept pace with some of the country markets, but on the last Monday the price of first quality clipped Down tegs advanced $\frac{1}{2}$ d. per lb., bringing the top quotation to $7\frac{1}{2}$ d., while that for small Scotch half-breds was 8d. per lb.

Fat Lambs.—The Easter lamb trade was fairly good, but extremely irregular as regards values. There was a very good show of about 3,000 at Islington on the 5th, but if the prime quality realised 1s. per lb., it was only in very exceptional cases, whereas at Carlisle as much as 1s. 4d. was reached. The best price at York was 1s. 2d., at Hull and Leeds, 1s., and at Dorchester only $10\frac{1}{2}$ d. The following week prices were more normal, but there was a fair demand at 1s. per lb. at many places, London being amongst the lowest at $10\frac{1}{2}$ d. With a smaller supply at the last market, the price rose to 11d., but rougher quality lambs could be purchased as low as 9d. per lb.

Fat Calves—The calf trade is always a special feature of the markets just before Easter, but, as with lambs, there was great variation this year in both supplies and values. At Leicester they made from 10d. to 1s. 1d. per lb., while at Exeter the top quotation was 8d. At many other markets it was 10d., but the average top price would be about 9d. per lb. After Easter, the special demand being over, prices sank to their former level, and $9\frac{1}{2}$ d. was about the extreme value; but few markets were quoted as low as 8d. per lb.

Fat Pigs.—Bacon pigs have met a steady demand throughout the month, but porkers have been in less request, as the season is drawing to a close. Early in the month the price at Carlisle went up to 7s. 9d. per 14-lb. stone, but this market was above the average, which was about 6s. 6d. to 6s. 9d. At Birmingham in the third week the price for prime bacon pigs was 7s. 3d. per stone.

Carcass Beef.—The trade for carcass beef, like that for live cattle, was somewhat featureless. There was a general firmness, with a moderate advance in most classes in the first week for the first qualities of each, but the second quality and cow beef were prejudiced by the large supply of Danish sides. These have to be promptly sold on arrival, and during the spell of warm sunshine just before Easter much had to be sold at nominal prices. To illustrate this it may be mentioned that one buyer purchased 35 sides of Danish beef at $1\frac{1}{2}$ d. per lb. There was a decided scarcity of port killed, and the best selected Deptford sides fetched $6\frac{1}{2}$ d. per lb., against $5\frac{1}{2}$ d. for English, and $6\frac{1}{2}$ d. for Scotch. The second week was a dull one. Home-grown beef declined from $\frac{1}{2}$ d. to $\frac{1}{4}$ d. per lb., and the price continued without any change during the remainder of the month at $6\frac{1}{2}$ d. for the best Scotch, and $5\frac{1}{2}$ d. to 6d. for English. Towards the close of the month American chilled became scarce, and advanced to $6\frac{1}{2}$ d. per lb. for hind-quarters, and $3\frac{1}{2}$ d. for fore-quarters. Argentine was far more plentiful, and remained at the low price of $4\frac{1}{2}$ d. per lb.

Carcass Mutton.—The price of mutton at the dead-meat markets

was rather slow to respond to the advance in live sheep, but, still, values were maintained at the highest rates of the preceding month. Later on, however, a steady upward movement set in, especially in connection with small Scotch tegs, the value of which rose at the close of the month to 7½d. per lb., while good wethers became worth 6½d. The total advance in English tegs was ½d. per lb., and these left off at 6½d. per lb. Frozen mutton was very cheap in London, the best New Zealand only fetching 3½d., and Australian 2½d. per lb.

Lamb was a disappointing trade for Easter at the London Central Market, nothing exceeding 11d. per lb., while really good quality was obtainable at 10d. The following week lamb declined ½d. per lb., and remained fairly steady for the remainder of the month at 10d. to 10½d. per lb.

Veal.—The scarcity of Easter veal so noticeable in many parts of the country was not felt in London, where there were abundant supplies of Dutch. Only a moderate advance took place, and the best quality only realised 8d. per lb. Afterwards the trade was overdone with supplies, and prices fell till on the 28th the highest quotation at Smithfield was only 6½d. per lb., while good English veal was offering at 6d.

Pork.—Although pork is supplied more or less in London markets during the whole year, the season is virtually over by the end of April. There was little doing after March this year, and prices remained very steady at 6½d. to 6¾d. per lb. for the first quality of English.

THE PROVISION TRADE IN APRIL.

HEDLEY STEVENS.

Bacon.—There was a much improved demand during April, and prices steadily advanced throughout the month. The brighter weather and Easter holidays increased the consumption of all hog products, especially hams, and, with the continued decreased supplies from the United States of America and Canada, prices have been on a basis of those generally realised during July and August, when the consumptive demand is larger than at any other time during the year for bacon and hams. Some of the Canadian curers now write that they do not expect to be again in a position to ship any of their products until the end of the summer. During the month arrivals have regularly reached this country from only four packing houses (and from those in greatly reduced quantities), the remainder having closed down that part of their business until pigs become cheaper and more plentiful.

The Danes are taking every advantage of this shortage of Canadian sides, their killings during April ranging from 30,000 to 45,000 pigs per week, and all arrivals are being sold at what are considered satisfactory prices, in some cases realising as much as some selections of English and Irish Wiltshires.

Importers of American bacon and hams have recently contracted much more freely, as they are now of the opinion that prices must continue on a high basis, at least throughout the summer months. Some American packers refuse to sell ahead at any price, the future being so uncertain. Prices for hogs during the month have ranged from

\$6'50 to \$7'60, against \$5'10 to \$6'05 for the corresponding month last year.

The demand for English and Irish bacon has been good at remunerative prices. Pigs were in moderate supply only, at hardening prices.

Cheese.—The consumptive demand has improved during the month, but has not come up to expectations, the prices obtainable being practically unchanged throughout. Arrivals from New Zealand have continued to be in excess of previous years, but, on account of the quality, Canadians have been taken in preference at the higher prices demanded. Coloured, on account of its continued scarcity, commands a better price than white.

Canada is now cleared of almost all last season's make. A recent issue of the *Montreal Trade Bulletin* states that production in Canada has decreased considerably during the past two years, the exports for the current season up to April 8th being 2,055,817 boxes, as compared with 2,294,866 boxes and 2,556,514 boxes for the corresponding periods in 1908 and 1907. There has been, therefore, a total shrinkage of 500,697 boxes in two years. "Some doubts are expressed as to whether the production of the coming season will not show a further decrease, as we hear of complaints in some districts of farmers being compelled to sell their cows for slaughtering purposes last fall, owing to the high price of feed. It is generally admitted, however, that the cows wintered well, and are showing up this spring in much better condition than at this time last year."

The estimated stocks of Canadian cheese at the three principal distributing centres (London, Liverpool, and Bristol) at the end of the month were 95,000 cheese, against 134,000 at the same time last year, and 128,000 two years ago. This reduction in stocks should lead to an advance in prices, but large shipments are on passage from New Zealand, which will have a steadying influence.

There has been a fair trade in English cheese at, in some cases, slightly higher prices, the stocks being about the average for the time of year. A few new fodder makes have been on offer.

Butter.—All dealers in this article have experienced another trying month's trade, and, although prices show further small reductions, buyers refuse to operate beyond their immediate requirements, and then only for the finest selections. There are also numerous complaints as to the quality of the recent arrivals from both Australia and New Zealand, attributed in the former case to the dry weather, and in the latter to the luxuriant rank grass eaten by the cattle.

London merchants are reported to have lost heavily on all their contracts this season with the Colonial factorymen, the butter realising for months past many shillings per hundredweight below the minimum prices guaranteed.

Stocks have been considerably reduced in Canada, the lower prices having increased the home consumption. During the month butter has been selling in Montreal and Toronto at equivalent to 7d. to 8d. per lb. less than at the same time last year, when famine prices were reached on account of the scarcity.

Eggs.—The Easter demand was up to the average, and trade has been fair throughout the month. Prices are lower on the month, and some pickling is in progress.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and SCOTLAND
in the Month of April, 1909.

(Compiled from Reports received from the Board's Market Reporters.)

Description	ENGLAND.		SCOTLAND.	
	First Quality	Second Quality.	First Quality	Second Quality
FAR STOCK:—	per stone *	per stone *	per cwt †	per cwt. †
Cattle:—	s d	s d	s d	s. d.
Polled Scots	8 4	7 11	38 10	35 9
Herefords	8 3	7 6	—	—
Shorthorns	8 1	7 5	37 9	35 1
Devons	8 5	7 9	—	—
	per lb *	per lb *	per lb *	per lb *
	d	d	d	d
Veal Calves	9	8	8½	7
Sheep.—				
Downs	7½	7	—	—
Longwools	7	6½	—	—
Cheviots	8½	7½	8	6½
Blackfaced	8	7	7½	6½
Cross breds	7½	6½	8	6½
	per stone *	per stone *	per stone *	per stone *
Pigs —	s d	s d	s d	s d
Bacon Pigs	6 9	6 2	6 8	6 0
Porkers	7 2	6 9	7 2	6 4
LEAN STOCK —	per head	per head	per head	per head
Milking Cows —	£ s	£ s	£ s	£ s
Shorthorns—In Milk	20 9	17 10	21 15	17 10
„ —Calvers	20 13	17 6	19 0	16 18
Other Breeds—In Milk	16 16	13 18	18 6	15 10
„ —Calvers	—	12 19	18 12	15 7
Calves for Rearing	2 4	1 13	2 16	2 2
Store Cattle.—				
Shorthorns—Yearlings	10 6	8 11	9 17	8 16
„ —Two year olds	14 1	12 8	15 0	12 14
„ —Three year olds	16 19	15 7	16 18	14 10
Polled Scots—Two year olds	—	—	15 19	13 14
Herefords—	15 13	14 10	—	—
Devons—	14 10	12 16	—	—
Store Sheep:—				
Hoggs, Hoggets, Tegs, and Lambs—	s. d	s d	s. d	s. d
Downs or Longwools	40 8	35 7	—	—
Scotch Cross breds	—	—	29 5	23 8
Store Pigs:—				
Under 4 months	25 4	18 10	23 5	18 11

* Estimated carcase weight.

† Live weight.

**AVERAGE PRICES of DEAD MEAT at certain MARKETS in
ENGLAND and SCOTLAND in the Month of April, 1909.**

* (Compiled from Reports received from the Board's Market Reporters.)

Description.	Quality.	London.	Birming- ham.	Man- chester.	Liver- pool.	Glas- gow.	Edin- burgh.
		per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
BEEF :—		<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
English	1st	54 6	54 6	53 0	—	59 0*	55 6*
	2nd	52 6	50 6	51 0	—	53 0*	50 0*
Cow and Bull	1st	40 6	48 6	47 0	43 0	46 6	44 0
	2nd	32 6	43 0	42 6	38 6	39 6	37 6
U.S.A. and Cana- dian :—							
Port Killed ..	1st	56 6	53 6	53 0	54 6	53 6	—
	2nd	52 0	48 0	50 6	50 0	51 6	—
Argentine Frozen—							
Hind Quarters...	1st	31 0	31 6	32 6	31 6	33 0	32 0
Fore „ ..	1st	23 0	24 6	23 0	23 0	25 0	24 0
Argentine Chilled—							
Hind Quarters..	1st	39 0	40 6	41 0	39 6	44 0	41 6
Fore „ ..	1st	28 0	30 0	30 6	29 6	31 6	30 6
American Chilled—							
Hind Quarters—	1st	58 6	58 0	57 6	57 6	52 0	58 6
Fore „ ..	1st	36 0	38 6	38 0	38 0	35 0	39 6
VEAL :—							
British	1st	68 0	68 0	76 6	81 6	—	—
	2nd	63 6	59 0	70 0	74 6	—	—
Foreign	1st	68 0	—	65 6	66 6	—	66 6
MUTTON :—							
Scotch	1st	63 6	62 6	69 6	70 6	64 6	63 0
	2nd	59 0	53 0	65 0	65 6	52 6	54 6
English	1st	58 0	63 0	64 6	63 6	—	—
	2nd	52 6	53 6	59 6	58 6	—	—
U.S.A. and Cana- dian—							
Port killed ..	1st	—	—	—	—	—	—
Argentine Frozen ..	1st	27 6	26 0	25 0	25 0	26 6	25 6
Australian „ ..	1st	24 0	24 6	23 6	23 6	—	—
New Zealand „ ..	1st	32 0	25 6	—	—	—	—
LAMB :—							
British	1st	100 0	95 0	101 6	102 6	—	—
	2nd	91 6	89 6	—	—	—	—
New Zealand ..	1st	46 0	49 0	45 6	45 6	53 6	55 0
Australian „ ..	1st	36 6	40 6	35 0	35 0	39 0	41 0
Argentine „ ..	1st	42 0	40 0	35 6	35 6	37 6	44 6
PORK :—							
British	1st	59 6	61 6	61 6	63 6	59 0	56 0
	2nd	53 6	56 6	56 0	59 0	55 6	49 0
Foreign	1st	59 6	56 0	57 0	57 0	—	48 0

Scotch.

AVERAGE PRICES of British Corn per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1907, 1908 and 1909.

Weeks ended (in 1909).	WHEAT.						BARLEY.						OATS.					
	1907.		1908.		1909.		1907.		1908.		1909.		1907.		1908.		1909.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Jan. 2 ...	26	0	35	1	32	0	23	11	26	9	26	7	17	3	18	4	17	4
" 9 ...	26	1	35	2	32	9	24	2	26	9	26	11	17	4	18	3	17	5
" 16 ...	26	1	35	5	32	8	24	1	27	1	27	1	17	5	18	5	17	5
" 23 ...	26	2	35	6	33	2	24	5	26	11	27	3	17	5	18	5	17	8
" 30 ...	26	3	35	0	33	0	24	4	26	11	27	6	17	5	18	4	17	9
Feb. 6 ...	26	6	34	3	33	4	24	5	26	9	27	7	17	7	18	3	17	10
" 13 ...	26	7	33	1	33	8	24	1	26	9	27	8	17	7	18	0	17	11
" 20 ...	26	10	32	6	34	1	24	2	26	5	27	11	17	9	17	11	18	0
" 27 ...	26	9	30	11	34	5	24	2	26	3	28	0	17	9	17	8	18	0
Mar. 6 ...	26	8	30	5	34	10	23	11	26	1	27	11	17	11	17	8	18	2
" 13 ...	26	10	31	3	35	8	24	2	26	0	28	4	18	0	17	10	18	2
" 20 ...	26	10	31	7	35	9	24	0	26	2	28	0	18	1	17	11	18	5
" 27 ...	26	8	31	4	36	0	23	9	25	10	28	0	18	2	17	10	18	6
Apl. 3 ...	26	9	31	3	36	5	24	3	25	5	27	10	18	3	17	9	18	8
" 10 ...	26	8	31	2	37	4	23	9	25	10	28	0	18	6	17	7	18	10
" 17 ...	26	8	30	11	38	7	23	3	26	1	27	8	18	7	17	7	19	2
" 24 ...	26	10	30	10	41	4	23	3	25	5	28	2	18	9	17	9	19	9
May 1 ...	27	0	31	6	42	5	23	6	25	8	27	10	19	3	18	0	20	0
" 8 ...	27	6	32	4	40	9	24	0	25	5	27	7	19	7	18	4	20	3
" 15 ...	28	4	33	1			23	10	24	9			20	1	18	7		
" 22 ...	29	7	33	8			24	3	25	9			20	5	18	10		
" 29 ...	31	4	33	5			24	0	24	6			20	8	18	8		
June 5 ...	32	0	33	1			24	7	25	10			20	7	18	4		
" 12 ...	31	10	32	7			24	7	24	5			20	11	18	4		
" 19 ...	31	4	32	0			24	11	24	2			20	9	18	5		
" 26 ...	31	2	31	5			24	6	24	0			20	8	18	7		
July 3 ...	31	3	30	11			24	8	23	11			20	11	18	7		
" 10 ...	32	0	30	5			24	10	24	4			20	11	18	5		
" 17 ...	32	6	30	7			24	6	23	1			21	1	18	5		
" 24 ...	32	11	31	5			27	3	26	5			20	8	18	6		
" 31 ...	33	2	31	10			26	4	24	4			21	2	18	7		
Aug. 7 ...	33	5	31	6			26	6	23	1			21	3	18	9		
" 14 ...	33	6	31	6			25	9	23	10			20	4	18	1		
" 21 ...	33	7	31	2			25	0	24	5			19	8	17	10		
" 28 ...	33	10	30	10			24	6	24	5			18	11	17	1		
Sept. 4 ...	31	11	30	10			24	2	25	5			17	7	17	3		
" 11 ...	31	4	31	5			24	4	25	11			17	6	17	6		
" 18 ...	31	5	31	7			25	0	26	0			17	6	17	3		
" 25 ...	31	8	31	5			25	3	26	8			17	8	17	2		
Oct. 2 ...	32	6	31	7			25	5	26	11			17	9	17	2		
" 9 ...	33	3	31	5			25	9	27	5			17	11	17	0		
" 16 ...	34	4	31	2			26	3	27	6			18	0	17	0		
" 23 ...	35	9	30	11			27	2	27	5			18	7	16	11		
" 30 ...	36	3	30	8			27	7	27	5			18	10	16	11		
Nov. 6 ...	35	10	30	11			27	8	27	6			18	10	17	0		
" 13 ...	35	1	31	2			27	8	27	4			18	8	17	0		
" 20 ...	34	7	31	10			27	5	27	3			18	9	17	3		
" 27 ...	34	7	32	3			27	5	27	2			18	7	17	5		
Dec. 4 ...	34	7	32	7			27	1	27	2			18	6	17	4		
" 11 ...	34	8	32	8			27	0	27	0			18	5	17	4		
" 18 ...	34	9	32	9			27	1	26	9			18	3	17	3		
" 25 ...	34	6	32	2			26	10	26	8			18	0	17	2		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lbs.; Barley, 50 lbs.; Oats, 39 lbs. per Imperial Bushel.

AVERAGE PRICES of Wheat, Barley, and Oats per Imperial Quarter in FRANCE, BELGIUM, and GERMANY, and at PARIS, BERLIN, and Breslau.

		WHEAT.		BARLEY.		OATS.	
		1908	1909	1908.	1909.	1908	1909.
		s. d.	s. d.	s. a.	s. d.	s. d.	s. d.
France :	March	39 0	39 4	25 11	26 5	19 11	21 0
	April	38 9	40 1	25 11	26 9	19 9	22 0
Paris :	March	38 5	37 11	26 2	23 3	19 6	20 11
	April	38 5	40 6	26 2	23 3	19 3	20 11
Belgium	February	34 5	36 0	26 4	26 1	20 10	19 10
	March	32 9	37 1	26 3	26 4	20 8	20 3
Germany :	February	44 9	44 9	29 6	29 6	22 8	22 6
	March	44 5	47 8	29 1	30 8	22 4	23 11
Berlin :	February	45 5	47 0	—	—	23 0	23 9
	March	44 7	49 5	—	—	22 6	24 9
Breslau :	February	44 7	42 1	29 10	30 8	20 11	21 4
				(brewing)	(brewing)		
				27 9	26 0		
				(other)	(other)		
	March	43 7	44 3	29 4	31 6	20 5	22 5
				(brewing)	(brewing)		
				27 9	26 0		
				(other)	(other)		

NOTE —The prices of grain in France have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*, the Belgian quotations are the official monthly averages published in the *Moniteur Belge*, the German quotations are taken from the *Deutscher Reichsanzeiger*, the prices for the German Empire representing the average of the prices at a number of markets.

AVERAGE PRICES of British Wheat, Barley, and Oats at certain Markets during the Month of April, 1908 and 1909

	WHEAT		BARLEY		OATS.	
	1908	1909	1908	1909	1908	1909
	s d	s d.	s d	s. d.	s d.	s. d.
London .	31 9	39 0	26 2	27 5	18 8	19 10
Norwich	31 8	37 9	25 11	28 0	17 6	19 0
Peterborough	30 5	39 4	25 7	26 8	17 2	20 0
Lincoln...	30 5	38 6	24 10	27 10	17 4	19 0
Doncaster	29 6	37 0	26 1	28 2	17 9	18 7
Salisbury	31 0	40 3	26 1	28 6	16 10	18 8

AVERAGE PRICES of PROVISIONS, POTATOES, and HAY at certain MARKETS in ENGLAND and SCOTLAND in the Month of April, 1909.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	London.		Bristol.		Liverpool.		Glasgow.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
BUTTER :—	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British ..	13 3	12 6	13 9	12 6	—	—	14 0	—
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery	104 0	100 6	104 6	101 0	100 0	97 0	98 6	94 0
„ Factory	—	—	96 6	92 0	94 0	87 0	—	—
Danish ..	110 0	108 0	—	—	110 0	107 0	109 0	—
Russian ..	99 0	96 6	102 6	94 6	99 6	94 6	101 0	93 0
Canadian ..	—	—	100 6	97 0	98 6	94 6	—	—
Australian ..	99 0	96 6	101 0	94 0	98 0	94 0	101 0	97 6
New Zealand	101 0	98 0	104 6	98 6	101 6	98 6	103 6	100 0
CHEESE :—								
British—								
Cheddar ...	78 0	69 0	74 0	67 0	75 0	70 0	65 0	61 0
	120 lb.	120 lb.	—	—	120 lb.	120 lb.	—	—
Cheshire ..	82 0	67 6	—	—	73 0	66 6	—	—
	per cwt.	per cwt.	—	—	per cwt.	per cwt.	—	—
Canadian ...	66 0	64 0	66 0	62 6	66 6	61 6	66 6	63 0
BACON :—								
Irish ...	70 6	67 0	71 0	62 0	69 6	64 0	68 0	65 0
Canadian ..	63 0	61 6	63 6	60 6	61 6	59 0	64 0	61 6
HAMS :—								
Cumberland ...	104 0	92 0	—	—	—	—	—	—
Irish ...	99 0	90 0	—	—	—	—	92 0	80 0
American ..	—	—	—	—	—	—	—	—
(long cut) ..	55 6	53 6	53 6	51 6	54 6	50 6	56 0	54 0
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British ..	9 2	8 1	8 4	7 11	—	—	—	—
Irish ...	8 9	8 2	8 4	7 11	8 7	8 2	8 2	7 7
Danish ..	9 5	8 1	—	—	8 4	—	8 8	7 10
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Langworthy ...	76 0	67 0	70 0	65 0	85 0	76 6	54 0	47 0
Scottish	—	—	—	—	—	—	—	—
Triumphs ...	69 0	63 0	66 6	61 0	58 6	53 6	—	—
Up-to-Date ...	70 0	60 0	72 6	58 0	58 6	53 6	41 0	37 0
HAY :—								
Clover	83 6	66 6	72 6	—	85 0	63 0	66 0	61 0
Meadow	75 6	59 0	65 0	—	—	—	56 0	51 0

DISEASES OF ANIMALS ACTS, 1894 to 1903.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

DISEASE	APRIL		FOUR MONTHS ENDED APRIL	
	1909	1908.	1909	1908
Swine-Fever :—				
Outbreaks	149	157	515	555
Swine Slaughtered as diseased or exposed to infection	1,563	1,015	4,772	2,921
Anthrax :—				
Outbreaks	126	88	485	409
Animals attacked	156	129	672	570
Foot-and-Mouth Disease :—				
Outbreaks	—	—	—	3
Animals attacked	—	—	—	112
Glanders (including Farcy) :—				
Outbreaks ...	66	55	219	268
Animals attacked	323	209	845	932
Sheep-Scab :—				
Outbreaks	37	35	409	606

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

DISEASE.	APRIL.		FOUR MONTHS ENDED APRIL	
	1909.	1908	1909	1908.
Swine-Fever :—				
Outbreaks ...	2	23	10	63
Swine Slaughtered as diseased or exposed to infection	46	253	117	1206
Anthrax :—				
Outbreaks ...	—	—	2	3
Animals attacked	—	—	2	6
Sheep-Scab :				
Outbreaks	26	23	253	244

ADDITIONS TO THE LIBRARY.

[NOTE.—The receipt of annual publications of foreign agricultural and other departments, experiment stations and societies is not noted in the monthly list of additions to the Library.]

Agriculture—

Department of Education, Sudan Government.—Third Report of the Wellcome Research Laboratories at the Gordon Memorial College, Khartoum. (477 pp.) London: Ballière, Tindall and Cox, 1908. 21s. net.

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Dorset County Council.—Report on Agricultural Experiments, 1907-8:—Varieties of Wheat, Oats, and Mangels, and Manuring of Mangels. (11 pp.) Dorchester.

Bateson, W.—Mendel's Principles of Heredity. (396 pp.) Cambridge: University Press, 1909.

Coleman, J. B., and Addyman, F. T.—Practical Agricultural Chemistry. (92 pp.) London: Longmans, Green, 1909. 2s. net.

French, Hy. F.—Farm Drainage. (384 pp.) New York: Orange Judd Co., 1909.

Myers, W. S.—Food for Plants. New Edition. (234 pp.) New York: W. S. Myers, Director, Nitrate of Soda Propaganda, 1907.

Bersch, W.—Handbuch der Moorkultur. (288 pp.) Vienna: Wilhelm Frick, 1909.

Mayer, S.—The Law of Agricultural Holdings. Fifth Edition, comprising the Agricultural Holdings Act, 1908. (212 pp.) London: Waterlow, 1909. 7s. 6d. net.

Live Stock and Dairying—

Ministère de l'Agriculture.—Traitement curatif de la Tuberculose Bovine par la "Tulaselaktin," du Professeur von Behring. (128 pp.) Buenos Aires, 1907-8.

Aikman, C.M.—Milk: Its Nature and Composition. Third Edition, edited by J. P. Sheldon and J. Golding. (180 pp.) London: A. and C. Black.

Wanklyn, J. A.—Milk-Analysis. New Edition, by W. J. Cooper. (99 pp.) London: Kegan Paul, 1908. 5s.

Pohér, E., and Razous, P.—Les Déchets et Sous-Produits d'Abattoirs, de Boucherie et de Fabriques de Conserves de Viande. (103 pp.) Paris: Société d'Éditions Techniques, 1908. 3fr.

U.S. Department of Agriculture, Bureau of Chemistry.—Circ. 42:—General Results of the Investigations showing the effect of Formaldehyde upon Digestion and Health. (16 pp.)

Insects and Fungi—

Department of Agriculture in India.—Memoirs. Entomological Series, Vol. II., No. 7:—Notes on Indian Scale Insects (Coccidæ). (27 pp+3 plates.) Pusa, 1908.

Houard, C.—Les Zoocécidies des Plantes d'Europe, et du Bassin de la Méditerranée. Tome 2nd. (573—1247 pp.) Paris: A. Hermann, 1909.

Hofmann, E.—The Young Beetle-Collector's Handbook. (178 pp.) London: Swan Sonnenschein, 1908.

Morris, F. O.—A History of British Moths.* Four volumes. (253+180+223+321 pp.) London: J. C. Nimmo, 1903.

Economics—

Bussen, F.—Landwirtschaftliches Genossenschaftswesen. (136 pp.) Hanover; Jancke, 1909. M. 2.

Deutsche Landwirtschafts-Gesellschaft.—Arbeiten. Heft 149 :—Ansiedlungen von Landarbeiten in Norddeutschland. (847 pp.) Berlin : Paul Parey, 1909.

Risultati Complessivi per Province e Regioni del Censimento del Bestiame, 1908. (29 pp.) Rome, 1908.

Ministère de l'Agriculture.—La Nouvelle Organisation de la Statistique Agricole en Italie. (137 pp.) Rome.

Statistiska Kommitténs Betänkande.—Jordbruksstatistik. (143 pp.); Handelsstatistik. (61 pp.) Stockholm, 1908.

U.S. Department of Agriculture, Office of Experiment Stations.—Circ. 51 (revised) :—List of State Directors of Farmers' Institutes and Farmers' Institute Lecturers of the United States (32 pp.). Circ. 82 :—Report of Committee on Station Organization and Policy. (10 pp.) Washington, 1908.

U.S. Department of Agriculture, Bureau of Plant Industry.—Circ. 21 :—Farmers' Co-operative Demonstration Work in its Relation to Rural Improvement. (20 pp.) Washington, 1909.

Forestry—

Indian Forest Memoirs. Chemistry Series, Vol. 1., Pt. 1.—A Note on the Analysis of Cutch and the Preparation of Pure Catechin. (20 pp.+vi plates.)

Engineering and Irrigation—

Deutsche Landwirtschafts-Gesellschaft.—Arbeiten. Heft 151 :—Der preussische Wassergesetzentwurf von 1907. (89 pp.)

Agricultural Industries—

U.S. Department of Agriculture, Bureau of Chemistry.—Circ. 41 :—Paper-Making Materials and their Conservation. (20 pp.) Washington, 1908-9.

U.S. Department of Agriculture.—Farmers' Bulletins. No. 343. The Cultivation of Tobacco in Kentucky and Tennessee. (28 pp.) Washington, 1908.

U.S. Department of Agriculture, Bureau of Plant Industries.—Bull. 138 :—The Production of Cigar-Wrapper Tobacco under Shade in the Connecticut Valley. (31 pp.) Washington, 1908-9.

U.S. Department of Agriculture, Office of Public Roads.—Bull. 33 :—Road Materials of Southern and Eastern Maine. (56 pp.) Washington, 1908.

Johnson, W. H.—The Cultivation and Preparation of Para Rubber. (178 pp.) Second Edition. London : Crosby Lockwood, 1909. 7s. 6d. net.

[Books may be borrowed from the Board's Library on certain conditions, which may be ascertained on application. The volumes marked * are not available for lending.]

SELECTED CONTENTS OF PERIODICALS.

Agriculture—

Rotations, *Primrose McConnell*; Farm Book-keeping, *C. S. Orwin*; Report of Lord Reay's Committee on Agricultural Education, *Norman Lamont*; The Nitrogen Problem in Crop Production, *E. J. Russell*. [Jour. Roy. Agric. Soc. England, 1908, Vol. 69.]

Versuche über Bakterienwachstum in sterilisiertem Boden, *H. Fischer*. (Centbl. Bakt., &c., XXII.).

Zur quantitativen Reinheitsbestimmung von Leinkuchen und Leinkuchenhöfen, *J. C. Schowie*; Studien über Tonbestimmung im Boden, *E. Arnitz*. (Landw. Vers. Stat., LII., 384).

Empfehlungen zur Verwendung von Kalkstickstoff oder Kupfervitriol zur Hederichbekämpfung? *L. Hiltner* and *F. Lang*. (Prakt. Bl. Pflanzenbau u. Schutz, March, 1909).

- Sur une théorie nouvelle de la captation de l'azote atmosphérique par les plantes, *E. Henry*. (Ann. Sci. Agron., 1909, 2 Fasc.)
- Landwirtschaftliches Unterrichts- und Versuchswesen, *C. Steinbrück*. (Der Boden u. d. landw. Verhältnisse des Preussischen Staates, 8 Band).
- Die Kolloide des Bodens und ihre Bedeutung für die physikalische Beschaffenheit desselben, *P. Ehrenberg*. (Ztschr. Forst- u. Jagdw., 41, 3).
- Kritische Studien über die Humussäuren. I. Eine verbesserte Methode zur Bestimmung des Sauregehaltes von Boden, *H. Süchtung*. (Landw. Vers. Stat., LXX, I. u. II.).
- Die Chemischen Veränderung des Kalkstickstoffes bei der Düngung, *H. Kappen*; Über die Zersetzung des Kalkstickstoffs, III., *F. Lohms* and *R. Moll*, Über stickstofffixierende Bakterien, IV., *F. Lohms* and *T. Westermann* (Centbl. Bakt., &c., XXII., 7-10).
- Zur Frage über die Zersetzung von salpetersauren Salzen durch Bakterien, *S. A. Sewern* (Centbl. Bakt., &c., XXII., 11-13)
- Die Bakterienflora von Runkelrüben, Steckrüben, Karotten, von Milch während der Stallfütterung und des Weideganges einschliesslich der in Streu, Gras und Kot vorkommenden Mikroorganismen und deren Mengenverhältnisse in den 4 letzten Medien. (Centbl. Bakt., &c., XXII., 14-17).
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THE "GREENING" OF POTATOES.

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The "greening" of potatoes intended for "seed," which is brought about by exposing the tubers to light for some weeks before planting until the skin assumes a dark green colour, is a practice that has been followed for many years, and is generally admitted to be productive of good results, although it is still too frequently neglected. The opinion of growers who consistently follow this practice is that the haulm or "top" is much more sturdy and robust than when the seed is not "greened," and this, as would naturally be expected, results in a better crop. Certain experiments have been conducted at Kew for the purpose of ascertaining in what particular manner "greening" proves beneficial.

Experiment No. 1.—Two batches, each consisting of twelve tubers of the variety called "Up-to-Date," and each batch having exactly the same weight, viz., 1 lb. 8 oz., were placed singly on a shelf in a room where they were exposed to a good light. The experiment commenced on August 25th, six days after the tubers were lifted. One batch was covered with opaque black paper, the other batch was left exposed to light. The sprouts were constantly removed on their earliest appearance, and all the potatoes were turned over once a week. The experiment terminated on March 25th. On weighing, it was found that the batch that had been covered with black paper had lost exactly $3\frac{1}{2}$ oz. in weight, whereas the batch that had been exposed to light,

and had become thoroughly "greened," had lost barely three-quarters of an ounce. Water probably accounted for most of the loss of weight; respiration would also be responsible for some loss; and the presence of sugar (Trommer's test) indicated a certain amount of activity in connection with growth.

In the following experiments, the kind of potato, the weight, and the duration of time were identical with those mentioned in the first experiment.

Experiment No. 2.—Both batches of potatoes were covered with black paper during the first five months of the experiment. During this period a certain amount of sprouting took place, the sprouts of the two batches weighing $2\frac{3}{4}$ oz. At this stage the two batches, after the removal of the sprouts, were practically of equal weight. One batch was now covered with black paper, and the other batch left exposed to light, and in this condition they remained until the end of the experiment. The sprouts produced by the batch exposed to light averaged a quarter of an inch in length, and weighed a quarter of an ounce. The sprouts of the batch covered with paper averaged three inches in length, and weighed $1\frac{1}{4}$ oz. The batch of potatoes that had been covered with paper throughout the experiment weighed $1\frac{3}{4}$ oz. less than the batch that had been exposed to light during the last two months of the experiment.

Experiment No. 3.—At the commencement of the experiment, one batch was covered with black paper and the other batch left exposed to light. This condition of things lasted for two months, when it was found that the covered batch had lost 1 oz. in weight, and the batch exposed to light had lost about 18 grains. From this stage both batches were covered with black paper, and remained so until the end of the experiment, when it was found that the batch that had been protected from light throughout the experiment had lost $3\frac{1}{2}$ oz. in weight, including the sprouts, whereas the batch that had been exposed to the light for the first two months of the experiment lost just over $\frac{3}{4}$ oz., including the sprouts.

The batch that had been protected from light throughout contained a considerable amount of sugar at the end of the



GREENED AND UNGREENED POTATOES

experiment, and when cooked had the sweet taste and close texture characteristic of many potatoes in the spring; whereas the batch that had been thoroughly "greened" immediately after lifting was quite "floury" and normal.

Advantages of "Greening."—The time is now past when small potatoes, good for nothing else, were considered good enough for "seed." The general opinion held at the present day is that it is essential to have a good, firm tuber that has not been partly exhausted by loss of moisture and continued formation of sprouts that are broken off when the tuber is planted. As the above experiments indicate clearly, this result is better attained with "greened" seed than with seed not so treated. A potato not "greened" loses just over six times as much in weight during the season as a potato of equal weight that has been "greened." A potato that is "greened" in the spring loses twice as much in weight as a potato "greened" immediately after lifting in the autumn, other things being equal.

Effect of Action of Light on Growth.—Under similar conditions of temperature, light much retards the growth or sprouting of a potato, whereas growth is greatly favoured by darkness. The explanation of this difference of behaviour in light and darkness respectively is as follows:—Before a potato can commence to sprout a certain amount of its starch must be converted into soluble sugar by means of a ferment or enzyme. Such enzyme can only be formed in a potato when there is a free interchange between gases formed in the interior of the potato and the atmospheric air.

An experiment proved that when the surface of a potato is coated with an impermeable varnish, except the "eyes," no sprouting takes place, even under the most favourable conditions for so doing.

The act of "greening" causes the skin or periderm of the tuber to become comparatively impervious to water and gases, hence the relative cessation of growth and loss of substance, whereas the periderm of a tuber kept constantly in darkness is not so impervious. The difference in amount of suberin present in the two cases is readily apparent on the application of tests for the presence of this substance.

The greatest amount of benefit derived from the "green-

ing" of potatoes will be obtained when it is practised in the autumn immediately after lifting.

In addition to the advantages indicated above, autumn "greening" will, to a great extent, check the ravages of winter-rot, which often spreads in a wholesale manner after potatoes are stored, the fungus readily gaining admission through the soft skin of ungreened potatoes.

The short, sturdy, firmly-attached sprouts of "greened" potatoes do not break off during planting. The long, weak sprouts of potatoes kept in the dark have to be broken off before planting, as they are useless.

EXPLANATION OF PLATE.

The two upper tubers were kept in darkness throughout the experiment. The sprouts shown are the second lot produced. The tubers are much shrivelled and flabby.

The lower tuber was exposed to light throughout the experiment. The sprouts shown are the only ones formed. The tuber is firm and solid. The corrugations on the surface were caused by scab of mechanical origin.

SALE OF SEEDS BY THE GERMAN AGRICULTURAL SOCIETY.

The importance to the farmer of seed of high quality and germinating power has been recognised on the Continent to a very much greater extent than has been the case in this country. Seed-testing stations, which give agriculturists an opportunity of having their seeds examined at a small fee, exist in all the northern European countries, and, in addition, the system of "seed control" ensures that a large proportion of the seeds sold are tested without any action on the part of the purchaser. The "control," it may be mentioned, consists in an arrangement whereby seedsmen enter into an undertaking with the authorities of a seed-testing station to sell their seeds with a guarantee of purity and germination, based on the results of tests made at the station. The seedsmen also accept the report of the station on samples taken by the buyer, so that compensation is payable in the event of a sample falling below the guarantee.

The work of these seed-testing stations, however, while it undoubtedly goes far to secure purity and high germinating power, still leaves untouched several other factors in the supply of seed which are of equal importance to the farmer.

It affords no guarantee, for instance, of the value or identity of the variety, nor does it indicate how far the seed has been taken from good specimens of the variety. In the case of cereals, the important point is that the seed shall have come from a variety giving a high yield, or having other desirable qualities; while in the case of roots the value of the crop as regards dry matter and sugar has to be considered, and on these points the testing of the seed will give no information. To the practical farmer the question of price is also of the first importance.

In order to assist agriculturists on these points, the German Agricultural Society has for many years carried on the business of supplying seeds to its members and others under conditions which are intended as far as possible to secure not only purity and high germinating power, but also the provision of seeds of reliable varieties.

The work is under the management of a Committee of the Society, and is divided into two parts:—(1) The Seed Bureau, which manages the business connected with the sale of seeds; and (2) a section which undertakes all matters connected with seed-breeding, testing of varieties, &c. The activities of the Society in the latter direction are of great interest, and have undergone considerable expansion in recent years. They embrace (a) a register of pure-bred seeds; (b) a system of "recognising" reliable varieties; (c) experiments for testing the value of varieties; and (d) competitions and prizes for seed-farms and for seeds.

The Register of Pure-bred Seeds.—The object of this Register is to encourage the breeding of valuable varieties of agricultural plants, to protect the originators of new varieties against unfair competition, and to protect the purchasers of seeds against deception as regards origin and description.

The Register appears to have originated from the point of view that when a plant-breeder as the result of many years' work has had the good fortune to produce a new variety, he may easily lose the reward of his labour owing to the variety, after it has been placed upon the market, being cultivated, and its seed sold by others. Many proposals were made in Germany with a view to afford legal protection to the original grower, but the difficulty of giving effect to them proved too

great. The Register, therefore, aims at giving protection to the breeder in another way, viz., by giving him the exclusive right to describe his seeds as "Entered in the Pure-bred Seed Register of the German Agricultural Society," and to use a legally protected trade-mark. All important agricultural plants are admitted to registration, except potatoes, in regard to which the identification of varieties presents too many difficulties.

For admission to the Register, proof of the work of selection over a number of years is required, while the value of the variety for agricultural purposes must be shown by independent trials. The Admission Committee consists of three experts of the first rank, and provision is made for the consideration of disputes as to right of entry.

The regulations provide that only plants which are the result of systematic selection are to be admitted, and by this is understood the continual utilisation with a definite object of variations in form on the basis of transmission by heredity by individual selection alone, or in combination with scientific crossing. Thus the so-called pedigree breeding, by the repeated selection of seed of the best plants, or crossing with a view to combine the desirable properties of different varieties, are both recognised. In order to prove that the variety is not a chance production, detailed records of the work of selection must be produced. Secondary growers of a variety are not admitted to the Register unless they can prove that they have effected an improvement in the original form.

The Regulation which requires the agricultural value of the variety to be shown by independent trials prevents any worthless sorts being entered, and these trials are carried out by the German Agricultural Society itself, or by some recognised experimental station.

The registered seeds are sold by the Seed Bureau, and it will be understood that the effect of the system is not only to protect the grower, but also to assist the farmer by directing him where to procure the best seed. The Bureau is under the scientific direction of Dr. Hillman, and, according to a statement recently made by him, the number of plant-breeders in Germany amounts to about 100.

"Recognition" of Reliable Varieties.—The basis of this

system lies in the idea that the testing or examination of samples of seed is not sufficient in itself, and that it should be supplemented by a knowledge of the conditions under which the seed is produced. For this purpose an inspection is made on behalf of the Society of the fields where the seed is grown, and of the arrangements for harvesting, and the "recognition" of the seed implies that the Society is satisfied that the seed sold will be true to name, of satisfactory quality, and in good condition. It thus affords protection to the buyer on the one hand, and to the seller of good seed on the other. The crop has to be inspected annually, the "recognition" only covering that particular crop. Recognised seed is generally sold through the Seed Bureau, and as regards corn and roots, only recognised seed is put in the Monthly Seed List. In all cases seed from inspected fields is listed separately from other seed.

The favour with which this system has been received will be gathered from the following table :

	1908.	1907.	1904.
Number of growers . . .	124	108	55
„ varieties entered . .	724	492	24 ⁰
„ "recognised" varieties	597	383	199

In 1904 the sale of this class of seed amounted to about 13,000 cwt., while in 1908 it had increased to 52,000 cwt.

The pedigree seed which is entered in the Register has also to be "recognised" before it is advertised for sale by the Seed Bureau, so that buyers thus get, as it were, a double protection. At the same time, growers (not being the actual breeders) who cultivate original sorts for seed, and breeders whose varieties are not admitted to the breeding register, can take advantage of the "Recognition" system, so that buyers can obtain pure-bred sorts under what is practically a guarantee of genuineness, without necessarily paying the higher prices usually asked by the original breeders.

The idea of a field inspection for seed has been very widely adopted throughout Germany by many central bodies, such as Chambers of Agriculture, and a number of these work in conjunction with the German Agricultural Society.

Experiments for Testing the Value of Varieties.—Trials of varieties of seeds have been carried on for a number of years, at first by the Society alone, and subsequently in conjunction

with other agricultural bodies. The experiments are conducted on the same lines, so that a large number of trials are made in all parts of Germany, and thus afford a basis for arriving at the average value of the individual sorts both generally and as regards their suitability to different soils and climatic conditions. The results are published by the Seed Division, as a supplement to the Seed List. In 1908 the number of tests carried out by the Society was 279, and by other bodies, 294; of these 543 referred to cereals, and the remainder to roots and beans.

Seed Bureau.—The Seed Bureau arranges for the purchase and sale of seed, and is under the control of a Special Committee, though the business is transacted by a paid manager. Seeds are only sold on behalf of members of the Society, and although each transaction is carried out through the Bureau, the contract note is drawn up as between the buyer and seller, and payments are made direct, and not through the Society.

The method adopted is for sellers to notify the Bureau of the quantity of seed they have for sale, and to forward a sample, together with a declaration of purity and germinating power. This sample is tested, and if the result is satisfactory a notice is published in the Seed List. A statement of quantity, price, nearest station, and description of seed is published free, but a fee is charged for additional particulars. Offers of corn and root seeds are now only published for "recognised" seed, though occasionally seed for which recognition was refused on account of a distinct cause, such as inequality in the crop, but which possessed special qualities otherwise, is included with a statement to that effect.

If the buyer wishes to have the seeds supplied tested, he must take a sample according to instructions and submit it to an approved seed-testing station. If the examination shows the existence of dodder, the buyer may return the consignment. Provision is made for second and third tests to be made in cases of dispute, and a formula is agreed upon for calculating the value of the seed according to the result of the examination. The cost of one examination is refunded by the Society. Twenty-five seed-testing stations have been approved for this purpose.

As regards the guarantee of purity and germination, seeds

are regarded as complying with the conditions when the test shows that they are free from dodder and agree with the guarantee within the following limits:—

For Purity.

2 per cent	for seeds with a purity of 90 per cent. and above.
3 " "	" " " " less than 90 per cent.

For Germination.

4.2 per cent.	with a guaranteed germination of 95—99.9 per cent.
5.7 " " " "	90—94.9 "
6.8 " " " "	85—89.9 "
7.7 " " " "	80—84.9 "
8.3 " " " "	75—79.9 "
8.8 " " " "	70—74.9 "
9.1 " " " "	65—69.9 "
9.4 " " " "	60—64.9 "
9.5 " " " "	55—59.9 "
9.6 " " " "	50—54.9 "

It will be seen from the above account that the action of the Seed Bureau in no way resembles that of co-operative societies who purchase seed for resale to their members. It goes much further than this by acting, on the one hand, as a medium for the sale of seeds grown by its members, and thus assisting them to dispose of their produce; and, on the other, by providing for its purchasing members the means of obtaining seed under the best conditions as regards genuineness, purity, and good quality.

The Monthly Seed List forms an advertising medium for three distinct grades of seeds, viz.:—(1) Pedigree seed offered by the original breeders, with the additional guarantees that the particular variety has been proved by independent tests to the satisfaction of the Society to have an agricultural value, and also that the actual crop from which the seed was obtained has been inspected and passed by expert representatives of the Society; (2) seed, which may be pedigree seed, though not grown by the original breeders, that has been inspected when growing on the farm, and "recognised" in the same way by experts as true to name, sufficiently free from disease such as rust and smut, of good general quality, and otherwise satisfactory; seed from prize farms is shown separately; (3) seed from uninspected farms which is sold merely on a satisfactory test of the sample forwarded. This applies chiefly to grass seeds and potatoes.

In addition to these provisions, the Society bears the cost of an examination of a sample of the seed delivered, while the

general regulations impose severe penalties for misdescription, thus affording extra protection to the purchaser.

The total sales of the Bureau in 1908 were about 102,000 cwt., 60,000 cwt. being cereals, roots, &c.; and 29,000 cwt. potatoes, the remainder being grass and miscellaneous seeds.

Railway Rates.—The German railways convey seed-corn at a special rate, by which only one-half of the actual weight of any consignment above 44 lb. is charged for. In the case of certain recognised seed farms, the reduced tariff is allowed at the time of conveyance, and in other cases it can be recovered by the buyer on making a declaration that the seed was used on his own farm.

STRAWBERRY GROWING IN HAMPSHIRE.

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The development of the strawberry growing industry in this country is becoming more and more extensive, and it is computed that nearly 30,000 acres are at present devoted to this particular form of culture, which in such counties as Kent and Hampshire has become a well-established and important industry, affording employment to many thousands of men, women, and, in the harvest time, as many children.

In the county of Hampshire, the area devoted to this industry extends from the sea northwards as far as Fareham, Wickham, and Bishop's Waltham. The industry is centred in the district of Botley, Sarisbury, Swanwick, and Southampton, and found its origin in this particular part of Hampshire, not as the result of a well-devised plan, arising from the natural adaptability of the soil for the growth of strawberries, but rather as the mere chance issue of a small-holder's enterprise many years ago.

Production in Hampshire.—The number of baskets of fruit despatched during last year from Swanwick Station amounted to 874,216, this number representing the output in a comparatively scarce season, as in the previous year, which was considerably more favourable to the setting and ripening of the fruit, the number of baskets despatched from this station amounted to 1,109,714. Large quantities of fruit are also sold to local dealers and to visitors.

Condition of Soil.—The adaptability of the soil to the growth of strawberries was a surprise even to those skilled in horticultural matters. The greater portion of the land was unsuitable for farming, and large areas were covered with furze and heather. Much of this heath land is now, however, being gradually acquired and broken up, and where plantations have been made, every sign of strong healthy growth is to be observed. The soil in this district assumes many different characteristics, and may consist of a sandy peat mixed with flints, varying in size from a marble to a hen's egg, while the small quantity of loam originally present has been washed away, giving the surface of the soil the appearance of a bed of flint stones. The greater portion of the subsoil is sand and gravel, but in some districts the gravel does not extend downwards to any appreciable depth. Last autumn I noticed a black, peaty soil, originally waterlogged, being surface drained, and in portions of the ground already planted the plants seemed to be thoroughly at home. Expert horticulturists maintain that strawberries require a rich loamy, or, in more familiar language, a "fatty" soil, but soils embodying these characteristics are of very rare occurrence in these districts.

Value of Land.—It is obvious that much of this common land was of little value some thirty or so years ago, but since reports have been circulated as to the large profits to be derived, the price has gradually increased to such an extent that it is no uncommon occurrence for land in close proximity to a railway station, or so situated as to be productive of early crops, to command a price of £200 per acre, while very ordinary-looking plots are in keen demand at from £100 to £150. Similarly, land may be rented at from £3 to £5 per acre, much of this land having been originally let for arable farming at from 10s. to £1 per acre.

Farmers who possess moderately large farms are now extensively engaged in this industry, and in such cases the rent of land under strawberries will not exceed £1 per acre, whereas the small holder will be paying up to £5 per acre for similar ground. It may safely be assumed that land has now reached its maximum value in these districts.

Small Holdings.—Many of the larger areas have been divided into small holdings or plots varying in size from

five to two acres, or even less; while the fact that one acre of strawberries may realise a profit of £50 is responsible for the general air of respectability and good management presented by these holdings. Among the population composed of strawberry growers, there are no signs of poverty, such as are witnessed in many semi-rural districts. A man can make a moderate living from two acres of land, while in many instances a man, his wife, and family are comfortably provided for on a holding of four acres. House accommodation is scarce, as in most instances the houses attached to each holding are either the property of the small holder himself, or are being gradually acquired by him on a system of easy payments, in addition to which, in the majority of cases, he is gradually paying for the freehold of his land.

While £50 is given as the average return per acre, the figure may fall as low as £30, or even £20, while in a favourable season it may rise to as much as £100. It must not be supposed that strawberry growing is unattended by any risks, and the beginner who is only possessed of a limited capital will find that such influences as, for example, late frosts towards the end of April or in early May may spell disaster to his crop, and involve the loss of the greater portion of his capital.

Varieties.—The varieties of strawberries most extensively cultivated are Royal Sovereign, Laxton, Leader, and Bedford Champion. The latter has gained much favour among the growers, and is of more recent introduction, having been derived by crossing Royal Sovereign and British Queen; the fruit attains an enormous size, and is of a rich flavour. Unlike the Royal Sovereign, the flesh is red throughout, the outer skin being of a glowing crimson. As a market variety it possesses the advantage of having firm flesh, thereby withstanding packing and travelling.

Planting.—Breaking up and planting fresh ground is attended with considerable labour and expense, land occupied by "brush or scrub" costing from £20 to £30 per acre to prepare, while to trench some of the lighter peaty or sandy soils will not cost more than £10 per acre. To plough land previously under cultivation to a depth of from 12 to 15 inches will cost from 15s. to 25s. per acre.

It is customary to apply liberal dressings of manure to the ground before planting, in many cases as much as 20 to 30 tons of London manure being given. The average cost of this manure is about 6s. 6d. to 6s. 9d. per ton, strawy stable manure being rather more than that composed of peat moss litter, in addition to which 2s. per ton for haulage to the ground, and from 2s. to 3s. per acre for spreading, must be allowed for, the average cost of manuring per acre working out at something like £12.

The cost of runners varies according to variety and quality, specially layered plants costing from 10s. to 15s. per 1,000, while "runabouts" (ordinary runners) may be bought for 5s. per 1,000. Assuming that there is less waste entailed in the purchase of stocky runners, and that weaklings are often planted together, the average cost of plants per acre is from £4 to £8, 12,500 to 16,000 plants being required for each acre of ground. If planted 2 ft. apart, nearly 11,000 plants are required per acre, but the distances between the rows and between the plants in the row vary considerably, and, in some instances, rows 30 in. apart, and 12 to 15 in. from plant to plant, are common, while in other cases "Paxtons" and "Nobles" are planted 2 ft. from row to row, and 1 ft. from plant to plant, in which case nearly 22,000 plants per acre are required.

After Cultivation and Life of Beds.—Pending the arrival of harvest time, considerable expense will be necessitated, especially on small holdings, where the greater part of the work is performed by hand. Where land is infested with weed seeds, and therefore liable to become foul very quickly, three hoeings are often necessary before the crop comes into profitable bearing, and each hoeing will cost as much as £3 per acre. In other words, the cost of keeping the ground free from weeds and removing runners from the time of planting to the period when the fruit is fit for gathering—on an average between twenty and twenty-one months—will amount to approximately £9 to £12.

The large majority of growers are adopting more hygienic principles as regards the bedding of their crops before the gathering season arrives. There is no objection to the bedding with manure provided that it be of a wholesome char-

acter and be placed on the ground in early spring, when the rains have an opportunity of washing the soluble constituents of the manure into the soil, leaving the sweetened or otherwise blanched portions of the straw for the fruit to rest upon. A large number of the growers now use clean straw at the rate of from 15 cwt. to 1 ton per acre, the cost of the straw being from 45s. to 50s. per ton, with the additional expense of 8s. to 10s. per acre for laying or bedding it between the plants.

The life of a plantation is largely dependent upon soil conditions and the amount of attention which has been devoted to the plants as regards manurial stimulants. On heavy soils plantations are often maintained for a period of five years, whereas on lighter land three years is the limit. No advantage is derived by prolonging the life of a plantation beyond the fourth year, and the more successful cultivators favour young plantations.

Gathering the Crop.—An average yield of strawberries taken over a series of six years may be estimated at 1,000 baskets per acre, each basket containing from 4 to 5 lb. of fruit. Some growers would, however, put this average at a considerably higher figure, and I have known several acres to yield as much as 2,000 baskets each; but these figures are exceptions to the general rule, and are only realised in particularly favourable situations when the plantations are at their best, and the season is propitious.

Excluding the special prices obtained for the few very early consignments, the price per basket in a good season may be put at 1s. 3d., while in a bad season it falls as low as 10d.; thus a fair average under all conditions may be estimated at 1s.

The cost of gathering the fruit is an item of considerable expense, and will vary from $\frac{1}{4}$ d. to $\frac{1}{2}$ d. per lb., or, on an average, $1\frac{1}{2}$ d. per gallon, in addition to which is the expense entailed in carting the produce to rail, and freight to London, which may be put at 3d. per gallon. The small growers usually seek the assistance of their families or friends when gathering their own fruit, the larger growers being obliged to employ casual labour. The former are not usually in possession of their own carts, and they are therefore depen-

dent on larger growers or carriers for the conveyance of the fruit to the station; in districts far removed from rail, as much as 6d. or 8d. per basket is expended in carriage to station, railway freights, and salesmen's commission.

Autumn Cleaning of Beds.—A further item in the annual expenditure is the cost entailed in cleaning the plantations of weeds, clearing up straw, and trimming plants after the fruiting season is over; these operations will cost from 10s. to 15s. per acre.

Marketing of Fruit.—Great strides have been made of recent years in regard to the methods of packing and transit of fruit, and the Swanwick and District Fruit Growers' Association, Ltd., have done much to encourage progress in this particular direction. The London and South Western Railway Company provide every facility for the transit of fruit by supplying specially constructed vans fitted with tiers of shelves, on which to place the handled baskets, a form of package long adopted among Hampshire growers. An extra staff of railway servants is also in attendance at the several stations in order to deal effectually with the respective consignments. The Midland Railway Company likewise supply fruit vans for the conveyance of fruit to the Midlands and counties further north.

The figures quoted in the following table are typical of some of the rates charged by the railway companies for the conveyance of fruit to various centres.

Town.	At company's risk.		At owner's risk.	
	Per cwt.		Per cwt.	
	s.	d.	s.	d.
London (Covent Garden) ...	1	11	1	9
Aberdeen	9	5	7	0
Belfast	6	8	5	10
Cardiff	3	0	—	—
Blackpool	5	8	5	3
Dundee	8	8	7	0
Glasgow	8	0	7	0
Leeds	5	2	4	6
Manchester	4	10	4	6
Southampton	6½		—	—

The varying capacity of baskets and their disposal when empty have presented a somewhat acute problem both to the grower and the salesman. In Hampshire the slender wicker basket is in common use, but its varying capacity and the difficulty of estimating the exact weight of contents detracts from its usefulness, and it is likely to be superseded by a form

of package known as the "chip." The buyer has objected to the trouble of returning the wicker baskets or paying a charge of 2d. in lieu thereof, and the new form of chip basket bids fair to meet this difficulty. These baskets contain a definite and uniform weight, and it is suggested that they should be sold with the fruit at an inclusive price, a practice largely adopted by the majority of Continental growers. The cost of the baskets, which amounts to 1d. each when purchased in 50 gross lots, will, it is contended, be amply covered by the extra price realised, owing to the buyers knowing exactly what weight of fruit they are purchasing. Further, many growers maintain that the fruit is damaged during transit when packed in the wicker baskets, their rough and irregular interiors bruising the fruit inside; the chip basket, made of smooth light veneer certainly obviates this difficulty and presents a much safer and more compact form of package.

Insect Pests.—Like all other plants which are raised to a high standard of cultivation, strawberries are assailed by a variety of insect pests, among the most prevalent and destructive of which is the wireworm. Where new ground is broken up and not over-deeply trenched, the grubs commence their ravages on newly-formed plantations, and continue to work havoc among the roots so long as the plantations exist. When new plantations immediately succeed old ones, the young plants are often completely destroyed. A good dressing with gas-lime at the time of preparing the plantation is the only effectual means of ridding badly infested areas of these pests. The poisonous nature of some of the constituents of this waste product, however, renders it necessary to allow a period of rest of about four months before commencing planting operations.

The Green Rose Chafer (*Cetonia aurata*), locally known as the Rookworm, is of a still more injurious character to the roots of strawberry plants. As a grub it feeds on the roots, while in the perfect state as a beetle it causes considerable injury to the blossoms by piercing a hole just below the flower buds, causing them to become detached from the parent plant.

In some districts very considerable damage has been wrought by the maggots of the Vine Weevil (*Otiorhynchus*

picipes). The results of such attacks were especially noticeable in a recent autumn, when plants occupying large areas were completely devoid of root growth and with slight exertion could be pulled out of the ground. I advised several growers who were suffering from the attacks of these insects to clear the infested area and dress with gas-lime, also stimulating the crops with manurial dressings. On completing inquiries later in the year one prominent grower informed me that he pulled up all the infested plants and dressed the ground with gas-lime at the rate of 12 tons per acre. The lime was well incorporated with the surface soil, and the ground subsequently received a liberal dressing of slag and kainit before planting in the following year. This treatment was attended with highly satisfactory results. Another grower resolved not to sacrifice all his plants, which were but two years old, and in order to destroy the maggots he dressed the ground between the plants with 1 ton of slag and kainit per acre; after two weeks the dressing was supplemented with 50 bushels of fresh soot per acre. At a later stage, when the ground was deeply stirred by hoeing, only a few sickly grubs were to be observed where, before dressing, they existed in enormous numbers.

Several plantations have also been infested with the Eelworm, which produces a distorted growth of the stem. As a means of checking the ravages of this pest, dressings of sulphate of ammonia and kainit have proved useful. "Damping off" or mildew is prevalent in some soils on which the growth of foliage becomes rank, but on the lighter gravelly soils fungoid growths are practically unknown.

MEADOW FOXTAIL (*Alopecurus pratensis*, L.)

DANIEL FINLAYSON, F.L.S.

Of the several species and sub-species of the genus *Alopecurus* commonly found in various parts of the country, the grass under consideration is the true Foxtail of the best meadows and pasture-land, and is the only one of importance. Meadow Foxtail is a perennial, and is indigenous to most, if not all, European countries; in habit of growth it is stoloniferous or creeping. As a pasture grass or on leys of several years' duration on suitable soils, it will produce early in the

season a greater weight per acre of valuable fodder than almost any other species of natural grass. The importance of Foxtail as occurring in the best grass land of the country cannot well be over-estimated, for, as an agricultural writer remarked more than one hundred years ago, "Foxtail possesses the three great requisites of quality, quantity, and earliness in a superior degree to any other grass." The opinion thus expressed as to its quality and importance has been confirmed again and again by many, if not all, of those best qualified by their experience and knowledge to express an opinion.

In a rich clay or loamy soil, Foxtail grows luxuriantly and produces a considerable quantity of nutritious, succulent, leafy herbage; it is specially adapted for moist situations, and thrives well on irrigated land; but where water is stagnant, or on poor, dry land, the growth is meagre and stunted, and it soon dies out. The early spring growth of Foxtail may in a measure be due to the manner in which it resists the adverse conditions of even a very severe winter. It is a hardy grass, and withstands with comparative ease the keenest frosts as well as the heat and sun of summer, and grows well under the shade of trees.

For a number of years the writer had under observation a piece of rich and somewhat heavy pasture and meadow land containing a good proportion of Foxtail; the special features which are usually associated with the growth of this valuable grass in suitable environment were there most marked. The ground in question was rich, but low-lying, and damp during the winter and early spring, yet under these conditions the Foxtail started into growth early, and as it predominated it was prudently mown much earlier than the crop in the adjoining fields not so favoured with an abundance of Foxtail. The aftermath also came quickly into growth, and produced a heavy and nutritious crop; thus on the pasture-land in which the Foxtail was in abundance, that early and full bite so highly appreciated by stock-owners, and so necessary after a hard winter, was secured at least a week in advance.

The characteristic tail-like appearance of the ear or flower-head closely resembles the cylindrical spike or flower of Timothy,¹ but a marked difference between the two may

be readily recognised at a glance or by touch alone. The colour of the flower-head of Foxtail is light green or silver-grey, and when drawn between the finger and thumb from the base upwards is soft and silky in texture; that of Timothy is harsh and rough to the touch. The florets of Foxtail have silky awns, those of Timothy no awns whatever; and, moreover, Foxtail is an early grass coming into flower early in April and in full bloom about the end of May, whereas Timothy is a late grass flowering in July.

To determine the feeding quality of a pasture it is necessary to know the various grasses of which it is composed by the leaf and shoot structure alone. Foxtail may be readily recognised in pastures, even when closely cropped by grazing animals, if the portion of the leaves remaining and the base of the shoots underground be carefully examined with a low-power lens. It will be observed that the shoots and leaves are glabrous or smooth, the base of the shoots reddish-purple in colour, the ribs on the leaves low and flat, while the ligule or membrane at the junction of the stem and leaf is shorter than it is broad, and is hairy on the back.

In the purchase of grass seeds of any kind it is sufficiently obvious to the farmer that the several species he intends to include in the mixture to sow down as pasture differ very widely from each other in shape, size, colour, and weight when closely examined, but it may not be apparent without expert examination that the quality of the different kinds is as varied as their appearance. The "seeds" of Meadow Foxtail (Fig. 1) consist of the entire one-flowered spikelet, which is ciliated along the keel of the glume and on its flattened edges. The glumes are united at the base to about the middle of the spikelet, and the flowering glume is awned. As the flower-head of Meadow Foxtail ripens very unequally, the vitality of much of the seed offered to farmers is very low, though the quality of this seed has improved very greatly during the last fifteen or twenty years. In the early experience of the writer as a commercial analyst in testing this seed, germination results varying from 5 to 20 per cent. only of vital seeds were the rule rather than the exception. Though the quality of the seed has improved year by year, and the farmer to-day can buy seed under a definite guarantee to

germinate 90 per cent., there are exceptions still to be met with, and that even where seeds are offered at a high price. The variations in quality are well shown in the three samples given below, analysed and tested quite recently :—

—	Purity.	Germination of the pure seed.	Utility.	Price.	Price of pure and germinating seed.
	Per cent.	Per cent.	Per cent.	s. d.	s. d.
I.	95	90	85·5	1 9	2 0½
II.	70	59	41·3	1 8	4 0½
III.	45	60	27·0	1 6	5 6½

Comment is scarcely needed on the above results. The difference in price between the highest quality and the lowest was only a matter of a few pence, yet, as can be readily seen, the pure and germinating seed in the cheaper quality cost nearly three times as much as in the dearer.

The light and chaffy character of many of the samples examined during the past season, and the manner in which the seeds cling together, afford opportunities for the admixture of worthless grasses and other impurities, perhaps more so than in the case of any other grass seed used on the farm. The seed that has been chiefly used for the purpose of adulterating Foxtail knowingly (or in some instances through careless harvesting) is that of Yorkshire Fog (*Holcus lanatus*, Fig. 2), Slender Foxtail (*Alopecurus agrestis*, Fig. 3), Tufted Hair Grass (*Aira cæspitosa*, Fig. 4), and Perennial Rye-grass.

In handling samples of Meadow Foxtail and *Holcus* and giving them only a cursory glance, there is a general resemblance between the two kinds of seed; but when placed side by side the points of difference between the two are unmistakable. In Foxtail an abundance of soft silky hairs on the glumes and a prominent awn are readily seen, while on *Holcus* the hairs are sparse, and when the seed is separated from the husk it is seen to be of an oval shape, silvery or shiny in appearance. In Foxtail the seed or kernel is not separated so easily, and when it is taken out of the husk the seed is found to be flat and of a yellow-brown colour.

The points of similarity and difference between the seeds of Meadow Foxtail and Slender Foxtail are easily seen



FIG. 1 —MEADOW FOXTAIL



FIG. 2 —YORKSHIRE FOG



FIG. 3 —SLENDER FOXTAIL.



FIG. 4 —TUFTED HAIR GRASS

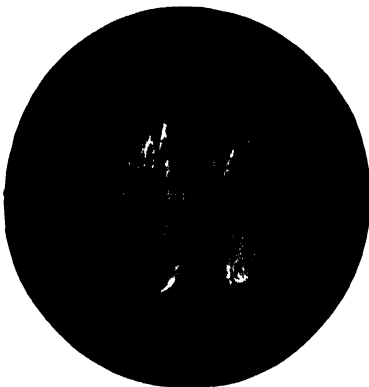


FIG. 5 —MEADOW FOXTAIL (LEFT);
YORKSHIRE FOG (RIGHT).

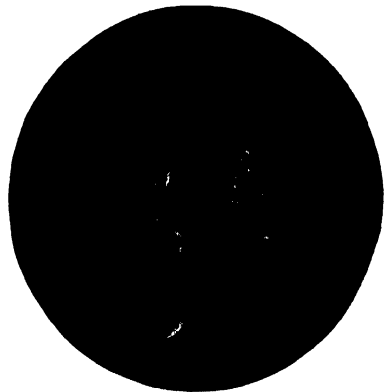


FIG. 6 —MEADOW FOXTAIL (LEFT);
SLENDER FOXTAIL (RIGHT)

without very close examination; the rougher and more harsh character of the seed of Slender Foxtail can be felt and seen. Both Slender and Meadow Foxtail are provided with a prominent awn, but the soft silky hairs so abundant in the latter species are almost entirely absent from the keel of the other. The seed of the Slender Foxtail is also somewhat the larger of the two, and is darker in colour.

In comparing Perennial Rye-grass and Foxtail the seeds are found to be widely different; there is no similarity in value, appearance, or weight, and though the first-named grass is a good one in its proper place and at its own price, when it is mixed with Foxtail in any quantity, either carelessly or by design, it very materially reduces the value of the sample; this is more readily understood when it is stated that one pound of Foxtail costs five times more than one of Perennial Rye-grass, and, moreover, the individual seeds of the latter weigh two and a half to three times heavier than the Foxtail.

In most samples we also find varying quantities of Hair Grass (*Aira cæspitosa*), in others various species of Brome Grass, Silky Bent Grass, Sorrel, and Dock. Amongst the useful grasses found in many samples of Foxtail are the Rough- and Smooth-stalked Meadow Grasses, Hard Fescue, Tall Fescue, Fiorin, Timothy, &c. These, though useful, still constitute impurities if found in what purports to be a pure sample of Foxtail.

The farmer, in arriving at anything like a true estimate of the real value of any seeds he intends to purchase, bases his judgment in the first instance on the external appearance of the seed and how it feels to the touch as it is passed from one hand to the other, the colour and shape of the seed, and its uniformity of character. Freshness and brightness, in most instances, indicate that the seeds are new, well matured, and presumably of high germinating capacity. In the case of Foxtail seed the purchaser cannot submit his sample to any such standard of excellence; the brightness of the seed in this instance is usually emphatic evidence of immaturity rather than of freshness and quality.

When a sample of Foxtail seed is submitted to a critical examination, it almost invariably happens that there are many seeds or grains present which at a first glance are apparently

sound and healthy, but are nevertheless entirely useless or worse. On examining these defective grains by means of a special contrivance whereby the seeds are rendered transparent, it can at once be seen that they have no germinating capacity whatever, the plumpness of the seed being due to the presence of the minute larva of the Wheat Midge on the anthers of the unopened flower. In a one-ounce sample recently analysed there were no less than fifteen hundred larvæ of this Midge curled up within the husk of the seeds.

Of the two to three thousand samples of farm seeds examined during 1908-9, only a very few of the samples of Foxtail submitted conveyed the impression that there might have been wilful adulteration, and if these few had been tampered with it was rather by the addition of extraneous rubbish and chaff to good seed than by the addition of any of the seeds mentioned in this article as bearing a remote resemblance to the true seed of Foxtail.

Foxtail varies very considerably in weight, from about four or six pounds to twelve or fourteen pounds per bushel. The absolute weight of 1,000 seeds is also of importance, and three samples weighed recently gave results as below :—

Foxtail.				Purity.	1,000 seeds Weight in grammes.
No. 1	...	...	...	Pure seed	1.041
No. 2	...	...	?	91 per cent.	0.846
No. 3	..	..	...	42 ,,	0.421

With Foxtail, as with all other seeds, good and pure seed commands a high price, and the farmer does well to make quality his first consideration and price the second. It is always best to purchase grass seeds separately, *i.e.*, not mixed. They should never be bought without a definite guarantee of genuineness, purity, and germination, and the weight per bushel should be ascertained.

HABITS OF GROWTH IN APPLE TREES.

WILLIAM E. BEAR.

In relation to distance of planting, pruning, manuring, and fruiting, the habits of growth among different varieties of fruit trees are considerations of importance which commonly receive too little attention.

Planting.^a With respect to planting on a commercial scale, it is obvious that if horse cultivation is to be pursued, at least

for some years after planting, the distances of trees from each other in the same plantation cannot well be varied in relation to compact or spreading habits of growth. There is, however, quite enough choice among varieties of apples or plums for the selection of a set of similar habits of growth to plant in any single field, and then the distances in different plantations can be varied accordingly. For example, in the case of bush-shaped apple trees—and half standards require but little if any more room—where gooseberries or currants are to be planted between them, a set of upright growers can be placed 10 ft. apart in each direction in one field, those of medium growth 12 ft. in a second field, and strong growers of spreading habit 14 ft. in a third, the distances of the bushes from trees and from each other in the rows varying in the same order from 5 to 6 and 7 ft. Where horse cultivation is not to be pursued, these variations in distances of planting may be made on the same piece of land.

Pruning.—In connection with pruning, the habits of growth of trees necessitate differences in the degree of severity in cutting them back, particularly in their early stage of development; in the amount of thinning of internal shoots required; and in the direction of wood-buds, from which the growth of future branches is to be encouraged. Feeble growers, which are usually disposed to fruit prematurely, to their permanent dwarfing, or which form naturally slender branches which will not properly bear the weight of their fruit, require to be somewhat severely pruned until they have become well furnished with sturdy branches. On the other hand, sturdy growers, excepting those which tend to produce branches too thinly disposed, need much less cutting back. Similarly, a variety of upright habit should be pruned just above buds pointing outwards as a rule, and often requires to have inside laterals shaved closely off the main branches; while a tree of spreading habit often needs to be pruned above a bud pointing upwards, and some of its internal growths may usually be left to form branches, others being spurred instead of being closely shaven. There are yet other varieties which send out shoots in all directions, so that they develop a tangled mass of crossing branches, keeping sunshine and air from their interiors unless severely thinned, in strong contrast to those which

form themselves in symmetrical shape almost without attention. Lastly, there are the varieties of apples which fruit mainly upon the ends of branches and laterals. These need shortening until well furnished with natural fruit spurs, but do not lend themselves to artificial spurring.

Manuring.—As to manuring, while the robust kinds are best without any dressing, except on very poor soil, until they have begun to fruit to a considerable extent, feeble growers, and particularly premature fruiterers, can hardly be too liberally manured from the first.

Stocks.—Another point is that of the stocks on which trees of differing habits of growth are raised. First-class nurserymen usually supply the varieties of apple trees on stocks suitable to them. For trees of bush shape, and to some extent for half-standards, they graft or bud varieties of free habit on the paradise stock, and those of feeble growth on the crab or the free stock. Unfortunately, however, they often have to meet orders by purchasing trees raised by outsiders, including foreigners, and then there is not the same security that the trees have been raised on the stocks best suited to the different varieties. Buyers should either study the subject for themselves, or acquire information from experienced growers, and then stipulate for the supply of each variety on the stock best suited to it.

Characteristics of Varieties.—To illustrate in detail the preceding general remarks, the results of careful observations made every season in a plantation of apple trees of bush shape, planted in the autumn of 1900, are particularly suitable, because the soil is a light loam over sand, which affords a good test of the vigour of different varieties. Moreover, the varieties are more numerous than they would be in a market plantation under ordinary circumstances, in consequence of several having been planted in single trial rows to afford guidance as to subsequent selections for more extensive planting.

Taking the varieties in the order in which they stand, and beginning with culinary apples, there is a striking contrast to be noticed between Early Julyan and Stirling Castle. The former is a robust grower of widely spreading habit and good shape, while the latter is the most dwarfed of all my varieties.

The only point which the two varieties have in common is that of abundant fruiting. But whereas Early Julyan, from its great sturdiness, withstands the fruiting strain well, there has been much difficulty in preventing Stirling Castle, although on the free stock, from "fruiting itself to death." Although the latter is an excellent early apple, it should be liberally manured from the first unless the soil is naturally rich, and pruned severely enough in its early stages to force wood-growth before it is allowed to bear fruit.

Potts's Seedling is a remarkably fine apple as far as its fruit is concerned, and is almost a model grower in form unless it is spoilt by canker. It is, however, exceedingly liable to this disease, and for this reason I think it should be condemned as a market variety.

Lane's Prince Albert is perhaps the most valuable of all cooking apples, as the tree is a great and regular bearer, and the fruit is fine, handsome, and fit for use all through the winter. Unfortunately, it is one of the weakest and most awkward growers, producing many thin shoots pointing inwards or downwards. It should be on the crab or free stock even for a bush, and liberal manuring is desirable for it. In pruning it every effort should be made to encourage the growth of a limited number of branches as long as their thickness renders safe, pointing upwards, though away from the centre, to correct their drooping tendency, while much thinning by the clean shaving of internal laterals is necessary to keep it open to sunshine. The bark of this variety has a peculiar liability to split in groups of shallow cracks.

Lord Grosvenor is a sturdy grower, as well as a profuse and regular bearer. It is one of the easiest varieties to prune, as its natural tendency is to grow in symmetrical form, neither too upright nor too spreading.

Bismarck is of a spreading habit, but not of robust growth on the paradise stock in my soil. It is one of the few varieties which, while extremely liable to scab, will not withstand the spraying necessary to remedy the disease. On some soils it forms a fine standard tree if on the crab stock. Royal Jubilee is a free grower of spreading habit, and yet tends to send out a profusion of growths pointing inwards, which need to be cut away.

Among the most vigorous growers is Bramley's Seedling, which needs, however, somewhat severe cutting back in its early stages to induce a multiplication of branches, as it naturally sends out only a few long ones thinly disposed and somewhat upright. Warner's King is as free a grower as Bramley, and more branching. Few, if any, varieties require more room. It needs very little pruning after it has been planted six years. Domino is a fairly strong grower, which shapes itself with a minimum of assistance, the chief pruning required, when it does not attempt to form fruit buds too early in its life, being the thinning out of internal shoots, which are apt to be numerous.

The most upright grower among my culinary apples is Golden Spire, a somewhat feeble grower, and a great fruiter in alternate seasons. Two trees of this variety require no more room than one Warner's King, which therefore occupies too much space when grown with more spreading varieties or where uniform distance from tree to tree is necessary. If left to itself, this variety grows long and slender upright branches, which are covered with apples from the bases to nearly the tips, as a rule, in every second season, while quite devoid of fruit in the alternate years. Newton Wonder, one of the most valuable of late-keeping apples, grows sturdily and in spreading form, needing very little pruning. Chelmsford Wonder is another free and spreading grower.

The most highly prized of all late-keeping apples, Wellington, is a failure in my soil, though elsewhere I have grown it easily and in good form. It is, however, only a moderate grower at the best, and is liable to canker. Lord Derby is another moderate grower, in form much more compact than Wellington. With me it grows feebly over the sand, but freely and in perfect form over the clay. Queen is a vigorous variety of spreading habit and excellent shape, needing a minimum of pruning.

Gascoyne's Scarlet is used both for cooking and for dessert. The tree is a very vigorous grower of spreading habit, but tends to form long and somewhat thinly disposed branches with few fruit-buds. It needs somewhat severe pruning in the early stages to keep this tendency in check. Another apple used for both purposes is Duchess of Olden-

berg, although only its bright colouring allows of its sale as a dessert apple. The tree is a persistently upright grower, and the ends of the branches have the bad habit of turning inwards. It needs severe pruning to outside buds in its early years to induce outward growth.

A third member of the dual type, but much superior to Duchess of Oldenberg for eating raw, is Peasgood's Nonesuch, a strong and sprawling grower, requiring to be pruned to upright buds from the first if grown in bush shape; but it is better grown on a short stem or as an ordinary half-standard. Great though the size of the fruit is, the crop is not usually considered large enough to recommend the variety to market growers. Moreover, it is subject to canker.

Turning to dessert apples proper, Cox's Orange may be first named as the best of all, but the most difficult to grow. Indeed, from its great liability to canker, in addition to its somewhat feeble growth, this splendid variety flourishes in only a few districts. Where it does well it grows in excellent form, neither too compact nor too spreading. Allington Pippin, an allied but greatly inferior apple as to flavour, is a more vigorous grower, and yet a troublesome one in consequence of its tendency to form a mass of inside shoots. These are best pared off closely, as the tree is such a profuse bearer that there is no need to spur the inside laterals. Gladstone is a weak grower of sprawling habit. Irish Peach grows lanky branches bearing chiefly at the ends and on long natural spurs. Like the few other varieties which fruit chiefly at the terminals of shoots, it is a troublesome apple to prune. The best plan is to cut the shoots back well until the tree is well furnished with branches, and then to leave it alone except for cutting out any excessive inside growth or crossing branches. Much sturdier and of spreading habit is Beauty of Bath, which is no trouble to train into a handsome tree. Lady Sudeley is fairly vigorous, and shapes itself well in moderately spreading form. King of the Pippins as a very compact grower, and Ribstone Pippin as a spreading one, may be condemned alike for market plantations on account of their inveterate tendency to canker. Worcester Pearmain forms itself in a cup shape naturally, and needs pruning

chiefly to keep the centre of each tree sufficiently open, its chief fault being density of growth.

Blenheim Orange forms one of the largest of trees of the dessert class, its slowness in bearing being favourable to rapid wood growth. It requires fully as much room as Warner's King or Peasgood's Nonesuch. As its branches are sturdy and generally well directed, a minimum of pruning is necessary for it, and any excess delays fruiting. Among late-keeping dessert apples, D'Arcy Spice Pippin, second only to Cox's Orange in flavour perhaps, does no good in my garden, and it failed equally in another garden over the London clay, though it grows with fair vigour in Essex, and fruits well. Duke of Devonshire, a fair substitute, does well, and its compact habit of growth makes it a capital garden variety. Claygate Pearmain, a delightful eating apple from November till February, if not till March, grows with fair vigour in spreading form, but is liable to canker. Mannington's Pearmain, at least as good as a dessert apple, grows feebly on this soil.

The majority of the varieties of apples named above are also grown in another plantation, on a loam over the clay. In this case the differences in vigour of growth are less marked than they are in the orchard over a subsoil of sand, but they are relatively the same, as also are the respective habits of growth.

PARASITIC MANGE IN HORSES, ASSES, AND MULES.

The term mange is applied to an infectious disease of the skin caused by the action of mange mites. There are three varieties of mange which affect these animals :—(1) Sarcptic, caused by *Sarcoptes scabiei*; (2) Psoroptic, caused by *Psoroptes communis*; and (3) Symbiotic, caused by *Chorioptes symbiotes*.

The mange mites belong to the order of acarina (mites). They are small creatures round or oval in shape, and usually only visible when magnified by the use of a hand lens or microscope. When fully developed they have four pairs of legs, but only three pairs in their earlier or larval stage. The legs are furnished with suckers, bristles, and claws. From

the head project prominent feeding organs, the jaws resembling saws. The body is furnished with scales, spines, bristles, &c. The females lay from 15 to 24 eggs at a time, which hatch out into larvæ in from four to seven days. These larvæ, after moulting several times, develop into adults. The mites can exist on moist dung for several weeks, and for a shorter time on a dry surface. The eggs, it is said, may retain vitality for two to four weeks if moisture is present, but on a dry surface only three to six days. Both mites and eggs are killed in a short period if exposed to a temperature of 104° Fahr. or over; but a moderate heat stimulates them, and they become more active. This occurs, for instance, in warm stables or at summer temperatures.

The three varieties of mange mentioned above are caused by different mites, each of which has a different mode of life.

The sarcoptes bore into the skin, propagate in the burrows they form, and produce rather severe inflammation of the skin.

The psoroptes live on the outer surface of the skin, and by means of their mouths and limbs cling to it. These also cause inflammation of the skin by their bites.

The symbiotes live on the outer scales of the skin, chiefly of the limbs and extremities.

Sarcoptic Mange usually starts on the head, neck, shoulders, or withers, but, according to the method of infection, may start in any part touched by saddlery or harness. The chief symptoms are an intense itching, which is exaggerated in sunshine or when the body is heated, causing the animal to bite and rub the parts. The lesions produced in the skin are in the form of small papules, from which the hair soon falls or is rubbed off, and as the disease spreads scabs are formed. The skin gets thicker, and often shows cracks and wrinkles. Sarcoptic mange is the variety most difficult to cure, and in old and severe cases treatment must be vigorous.

Psoroptic Mange.—This variety of mange in horses usually begins on the sheltered parts of the body, as the roots of the mane and tail, but it may spread all over. In a general way it may be said that the inflammation and scab formation on the skin resulting from the bites of the psoroptes

are similar to the symptoms of the sarcoptic variety, but in psoroptic mange the affected areas of skin are more clearly defined, and the rate of spread to surrounding parts is slower than in the first-mentioned variety. In bad cases spread over large areas it looks very like sarcoptic mange, and differentiation depends on the identification of the mite.

Symbiotic Mange.—This is usually confined to the extremities of the legs, more particularly the hind ones. It develops slowly, and exceptionally it may invade other parts of the body. This variety is fairly easily cured on the application of the ordinary remedies.

Method of Spread.—Mange being solely due to either of the before-mentioned mites, all cases can be traced to contagion from an existing or pre-existing case. The disease may be spread directly from one animal to another, or, as more frequently happens, indirectly through the medium of litter, rugs, grooming utensils, saddlery, harness, stable walls, partitions, &c.

Prevention.—On the first suspicion of mange the affected animal should be isolated, and care taken that no grooming utensils, rugs, &c., that have been used on affected animals are used on others until after disinfection.

In addition to treating an animal for mange, particular attention must be paid to cleansing and disinfecting the stable and articles that have been used for or about the patient.

Although parasitic mange in horses, asses, and mules is not the subject of administrative action throughout Great Britain, a model Order issued by the Board of Agriculture and Fisheries under the Diseases of Animals Acts is in operation in the districts of many local authorities.

The Board, on application by a local authority, are prepared to issue such an Order, prescribing notification, detention, and treatment to be carried out by owners of horses, asses, and mules affected with mange in the area in which the Order operates.

The Orders issued are made applicable only to the forms of parasitic mange known as sarcoptic mange and psoroptic mange.

In a district in which a Parasitic Mange Order is in force, every person having in his possession or under his charge a

horse, ass, or mule affected with or suspected of parasitic mange must keep that animal separate from others not affected, and notify a police constable of the fact of the animal being so affected or suspected.

Goosefoot.—Among weeds of the annual species, few are more troublesome to the farmer or gardener than *Goosefoot* (*Chenopodium album*, L.). This plant, known also as Fat-hen, Meld-weed, Lamb's Quarters, and in Canada and the United States of America as Pig-weed, is closely related to the mangold and spinach, and may attain to three or more feet in height. It occurs throughout the British Islands. It grows erect (*See Plate*), is much branched, with somewhat pointed and toothed narrow leaves up to three inches in length, the leaf stalks being long and slender. The flowers, which appear from July to September, are borne in clusters on spikes placed in the axils of the leaves and terminating each branch. They are small, greenish, and without petals. The seeds are black and glossy, and Percival has likened them in shape to a flattened bun. The colour of the whole plant is rather light green, and it has the appearance of being powdered with white or pinkish particles. The seedling is of a silvery-green hue.

Goosefoot grows freely in waste land, but is a gross feeder and grows rapidly, and hence attains its greatest size and vigour on good cultivated land, where it frequently occurs in great quantity and gives much trouble, crowding and choking the sown crops. It is especially plentiful among potatoes and other root crops. Seed is produced in abundance and may lie dormant in the soil, coming up at unexpected times. The seeds are often plentiful in commercial samples of seeds of all kinds.

Where Goosefoot occurs among cereal crops it may be largely destroyed by surface cultivation with light harrows when the cereal is two or three inches high, the latter being deep-rooted compared with the weed, which in the young seedling stage is easily loosened from the soil. Should the

plants occur in small numbers, or the growing crop be too far advanced to admit of the use of the harrows, or be otherwise unsuitable, hand-pulling should be resorted to, if possible in hot, dry weather. Among root-crops, Goosefoot should be attacked by vigorous and frequent hoeing when the plants are small, and on a hot day they will quickly wither. Large or late plants should be removed by hand, an endeavour being made in all cases to prevent seeding.

Annual Sow Thistle.—The Annual Sow Thistle (*Sonchus oleraceus*, L.) is a weed which causes considerable trouble in arable land. It is an erect plant which may attain three feet in height, and has a tubular grooved stem, which is branched, smooth, and shiny (*See Plate*). The leaves are bright green, the lower ones being stalked and much lobed, the upper lobed, or entire and angular, and clasping the stem. The flowers, which appear in summer between June and September, are borne in crowded "heads" of smooth or slightly cottony yellow flowers. The fruit is attached to a feathery pappus, which enables it easily to be borne away and distributed by the wind, and it should be remembered that this weed is only propagated by seed.

In view of the fact last mentioned, it is clear that where *Sonchus oleraceus* occurs, either in small or large quantity, the first thing to be considered is the prevention of seeding, and to this end it is important that the plants should be cut down before the flowers appear. The cutting of the plants, moreover, should not be confined to the fields actually infested, but should extend to any waste land which may be adjacent, for such land is usually a fertile source of the thousands of seeds produced by this plant. Cutting off with the hoe below the surface of the soil, or pulling up by hand, will be equally effective in destroying the annual sow thistle. The easiest time for hand-pulling is when rain has softened the ground, and in corn crops this is doubtless the most expedient method. The regular and thorough hoeing generally practised should keep this weed down in root crops, and the same remark applies to garden cultivation.



In connection with the eradication of the clover parasite, Dodder, an article on which appeared in this *Journal* for Sept., 1906, p. 331, the Board have

**The Eradication
of Dodder.**

received some interesting notes from Captain S. M. Smith, who has made some experiments with a view to suppress dodder on his farm near Birchington. The clover was sown in 1907 on a thin barley crop, and came up an "extraordinarily fine thick plant," but was attacked by dodder, locally known as Hell-weed. Patches were first scarified with a rake, and the dodder appeared to die down, but after subsequent cutting of the clover it was found that the dodder tendrils were plentiful, and scarifying alone was concluded to be "absolutely useless." In their Leaflet No. 180, the Board condemn tearing out the dodder with a rake, and this advice was found to be quite sound. Dressing the patches with calcium sulphide was not practicable on account of the prohibitive cost of the material, 1 cwt. covering only about 10 perches. Moreover, it was not found to have any good result. The use of lime was also unsuccessful.

In 1908 clover ("seeds") was sown on a seven-acre field, and again dodder made its appearance, and Captain Smith remarks that "it is astonishing how very quickly the rings are formed. It reminds one of *Tinea tonsurans* (ringworm) on young cattle and horses in the manner it thrives and its rapidity of growth." In neither 1907 nor 1908 was the attack due to impure seed, since seed from the same bulk sown on a neighbouring farm was not infested. The plan then tried consisted in removing the surface of the affected spots with a plate-spade and burning the material (earth, dodder, &c.) mixed with old thatch in the centre of each patch, followed by burning a layer of waste straw on the top of the cleared patches, taking care to put it well on the edge, even sacrificing a portion of the unaffected crop round the edge. This plan was carried out in September, 1908, and appears to have been entirely satisfactory, and Captain Smith, writing in May of the present year, states that "there is now no sign of the dodder on the growing clover."

The infested patches treated in 1908 were twenty-five in number, and from three to six paces in diameter, whereas

in the previous year those on the matured clover were nearer ten or twelve paces. It took the farm bailiff and an assistant about half a day to go over the seven acres, cut over the affected spots with a plate-spade, strip round the edges of the patches, lump the scrapings on the centres, put on old rough dry litter (old thatch), and burn it. The total cost was perhaps 5s. Captain Smith concludes that the chief points in connection with dodder are:—

(1) To discover it on the young seeds in the first autumn, and not postpone search for it until the following spring.

(2) Where dodder is present, to insist on the removal of a part of the healthy plants around the edges, it being better to sacrifice a little in the autumn than lose whole perches in the next spring and summer. By this means the young tendrils of the dodder are caught.

Burning after paring over the patches is much cheaper than the lime treatment. It is also suggested that a little trifolium may be sown on the burnt patches a few days after burning, for although it will be ready before the clover in the spring, it at least results in the provision of useful fodder and obviates the bad appearance of the attacked field.

Pear Leaf Blister Mite (Eriophyes pyri).—During the month of May several cases of an attack of the Pear Leaf Blister Mite were reported to the Board,

**Notes on Insect,
Fungus, and other
Pests.**

and there is good reason to believe that this pest is increasing in frequency in Great Britain. The most interesting of the records came from Hunstanton, in Norfolk, where the owner has observed the attack for at least three years. Two "Marie Louise" pears were planted seven years ago, and one did well till 1907, when it showed signs of a bad attack by the mite. The other tree, which had never borne any blossom, remained free. In 1908, however, the second tree was attacked to nearly the same extent as the first, which in August, 1908, had nearly every leaf affected. The leaves were sprayed in the autumn with paraffin emulsion. In May 1909, the trees were at first reported to be as bad as last year, but towards the end* of the month it was stated that they were in much better health than they had been for three years, and many

of the leaves were quite clear of infection. The removal of the infected leaves was, therefore, possible, and the lime-sulphur-caustic-soda wash is to be tried in the winter. The other trees in the garden have not yet been infected. A second case, reported from Harpenden, Herts, showed distinct traces of the spread of the pest. The writer stated that he had thirty-seven fruit trees in his garden all free from disease, except four pear trees, a Pitmaston Duchess, a Louise Bonne of Jersey, a Bon Chrétien (Williams), and a Durondeau, each of which was affected by the mite, the first mentioned generally, the other three very slightly. A neighbour had several pear trees more seriously affected. A third attack, reported from Banwell, in Somerset, is said to have been first noticed in the garden this year. The Board would be glad to receive information of the presence of the pest in any part of Great Britain where it appears. Mr. Theobald has records of it on a few leaves in gardens in Cambridgeshire, Bedfordshire, Sussex, Devon, and Cornwall; in Somerset at Bruton, Bath, Minehead, Porlock and Clevedon; in Surrey at several places; in the Wye Valley at Chepstow; and in Wales near Criccieth and near Dolgelly. In his opinion it did not increase much till the last two or three years, but is doing so now, and is very bad this year. Mr. Collinge has records of attacks during 1907-1909 at Berkhamsted (Herts), Coventry and other localities in Warwickshire; in Worcestershire; at Bowden in Cheshire, Wellingborough in Northants, and previously to 1907 in Lincolnshire. He believes it is spreading rapidly.

The Bud Moth (Hedya ocellana).—A case was reported from the Wisbech district of this pest, which is common over the South of England. Insufficient details were given to judge whether it was present to any great extent.

The Willow Beetle (Galerucella lineola).—Information having reached the Board that a serious attack of this beetle had occurred in Somerset, an Inspector was despatched to visit the district and report. He found that a large number of osier plantations in the neighbourhood of Yeovil were seriously affected, and that the pest had been present in considerable numbers for some three years. Many of the willows had been ruined for commercial purposes; the shoots, which should

have been seven, eight, or nine feet long, were stunted, and only three to four feet long. As there are some thousands of acres under willows in Somerset, one grower alone having more than two hundred, the infestation is obviously an important matter, for the crop is estimated as worth £25 an acre. In some cases the whole crop has been destroyed. The shoots at the time of the visit were only a few inches high, but were already attacked by the beetle, and a large number of eggs were seen from which the grub would shortly emerge. Both grub and adult beetle eat the leaves, and there is reason to believe that there are two broods in the year. Various remedies had been tried, but apparently without success. The use of arsenate of lead was suggested, and the results will be watched with interest. See also notes in this *Journal* for July and November, 1908.

In addition to this two other beetles were found, *Polydrusus pterygomalis* (Boh.), a green weevil often found on the leaves of oak, beech, and hazel, as well as willow; and *Crepidodera aurata* (Marsh), the flea beetle found on the leaves of willow and poplar.

According to the official "Indian Trade Journal" (Calcutta) of 25th March, a circular has been issued by the Indian Railway Board, in which it is

**Wheat Elevators
in India.**

pointed out that the extensive additions now being made to the Port of Karachi and the steady increase in the cultivation of wheat in the Punjab indicate that at no distant date the North-Western Railway will have to deal with a very large tonnage of wheat requiring to be delivered at the port within a comparatively short time. The Railway Board consider that this possibility is one that requires careful examination so that steps may be taken in anticipation to meet the reasonable demands of trade, while at the same time avoiding the expenditure of a very large amount of capital to meet a sudden and comparatively short rush of heavy traffic.

The Director-General of Commercial Intelligence has suggested that the introduction of the "elevator" system of dealing with wheat would tend to regulate rushes of traffic,

and at the same time be of general benefit both to the merchant and the cultivator.

It is pointed out that the function of grain elevators in the interior of the country would be to act as warehouses in which produce could be protected against deterioration and loss, until a favourable opportunity for its sale occurred. Under present conditions grain in India is very perishable, and although the cultivator may be under no obligation, from need of money, to sell immediately after harvest, yet in order to prevent loss from weevil, rats, and mould, the grain is commonly sold at low rates to firms who can run it out of the country quickly and turn it into money.

One of the advantages of elevators in the interior would therefore be that in years of heavy crops they would expedite transit in the earlier weeks, and preserve for later shipment such surplus as the foreign markets did not want at that time, while in years of shortage they would afford a reserve of food for the people, and bring to the holders of wheat a greater profit than they could have gained by exportation.

In connection with this question a statement has been prepared by the Commercial Intelligence Department of India, showing the movement of wholesale prices of wheat at Delhi for twelve years, beginning with 1897-98, from which it appears that, taking the average price in April, May, and June over the whole period as 100, there was on the average a rise in the month of July of 2·18 per cent., which increased to 10·90 per cent. in November, and to 13·48 per cent. in February. Although individual years show variations from this general tendency, there was only one year in this period in which the fall after harvest was so considerable as to be serious, and it is considered, therefore, that there should be an ample margin for the payment of interest and maintenance charges on the elevators.

* The figures of the Census of live stock, which was taken in Germany on December 2nd, 1907, have now been published. It will be seen from the following table that there has been an increase in all classes of animals, except sheep, compared with earlier years :—

**Census of Live Stock
in Germany.**

	1907.	1900.	1892.	1883.	1873.
	In thousands.				
Horses, including military horses	4,345	4,195	3,836	3,523	3,352
Cows	10,967	10,459	9,946	9,087	8,961
Cattle, total	20,631	18,940	17,556	15,787	15,777
Sheep	7,704	9,693	13,590	19,190	24,999
Pigs	22,147	16,807	12,174	9,206	7,124
Goats	3,534	3,267	3,092	2,641	2,320
Fowls	77,103	64,453	—	—	—

The number of cows has risen by about half a million during the past seven years, while the total number of cattle shows an increase of nearly five millions since 1883. Sheep, on the other hand, have diminished from 19,190,000 in 1883 to 7,704,000 in 1907, the decrease in the past seven years being nearly two millions. In the case of pigs, however, the figures show a great expansion, the number having risen from 9,206,000 in 1883 to 22,147,000 in 1907. Poultry also show a substantial increase, while the number of bee-hives is returned at 2,594,690 compared with 2,605,350 in 1900.

The Departmental Committee appointed by the President of the Board of Trade in July, 1908, to inquire how far and in what manner the general supply, distribution, and price of meat in the United Kingdom are controlled or affected by any combination of firms or companies, has recently presented its report [Cd. 4,643, price 3d.]. The members of the Committee were Lord Robert Cecil, K.C., M.P. (*Chairman*), Mr. C. W. Bowerman, M.P., Sir T. H. Elliott, K.C.B., Mr. W. Field, M.P., Mr. H. Fountain, Mr. W. Dudley Ward, M.P., and Mr. William Weddel. The Report deals first of all with the sources of the meat supply, and then proceeds to discuss the existence of combinations in the meat trade.

No suggestion was made to the Committee as to the existence of any combination controlling or attempting to control the home meat trade, or the trade in such supplies as are received from the continent of Europe, while the trade in frozen meat from New Zealand and Australia appeared also free from such attempted combinations.

The Committee observe that owing to the number of persons interested, the diversity of their interests, and other

circumstances connected with the home meat and frozen meat trades, any combination in regard to them would be extremely difficult to establish or maintain, and they are satisfied that no such combination exists or is likely to exist. Subject to the consideration which is referred to below, the same may be said of the Argentine trade.

The position of the four American companies, which form what is known as the United States Beef Trust, is discussed, and in the opinion of the Committee a measure of combination does exist, and they describe the companies as carrying on their business in co-operation rather than in competition, though this co-operation appears to be for the purpose more of advancing their own interests than of injuring the trade of others.

The conclusion of the Committee is that the combination which exists between four of the United States companies engaged in the beef trade in the United Kingdom is not at present sufficiently powerful to be a serious danger to the beef trade as a whole. About three-fifths of the total supply of beef and veal comes from home-grown beasts, and of the remainder a large and increasing proportion comes from Argentina and Australasia—the supplies from the former country having advanced very rapidly in the four latest years.

As regards Argentina, however, it appears that although until lately the supplies of the United States firms trading in the United Kingdom have been drawn solely from the United States, one or other of the four American companies has recently bought out two large Argentine companies, and it seems certain also that other negotiations, having for their object the acquisition of existing works in Argentina by United States firms, are proceeding. There have also been inquiries by representatives of United States firms in Australia and New Zealand.

The Committee gather from this that it is within the limits of possibility, to put it no higher, that the United States firms will acquire very considerable interests in Argentina, and perhaps elsewhere. If this should be the case, it is not improbable that the methods of combination, which have been adopted so effectively in the United States, might be

extended, at any rate to Argentina. They point out, however, that the Estancieros of that country, who are men of considerable wealth, and consequently able to protect themselves, are very much opposed to such an invasion from the United States, fearing that the prices for their cattle will be affected by the absence of competitive buying. On the other hand, the general course of the Argentine railways, converging as they do on Buenos Ayres, and the consequent tendency towards the establishment of the works in or near that town, create a condition not unfavourable to some combination amongst the owners of such establishments. Such a combination has existed in a rudimentary form in the past, and, under the vigorous and experienced guidance of the United States firms, it might be brought to a much higher state of development in the future.

It does not seem likely that this condition of affairs will arise in the near future, but in the event of its doing so the Committee are of opinion that the situation in regard to the beef supply of the United Kingdom might well become serious. With the command of practically the whole of the imported live cattle, and chilled and frozen beef, the firms composing such a combination would be in a very strong position in regard to Smithfield as well as to a number of important provincial markets.* In that event they might even be able to exercise a determining influence upon beef prices in Smithfield itself, and largely to affect prices throughout the country.

The Secretary for Scotland recently appointed a Departmental Committee to inquire into and report upon the methods commonly followed in the Highlands and Islands of Scotland in the breeding and keeping of poultry and the sale of poultry and eggs, and especially into the results of the efforts of the Congested Districts Board to promote this industry, and to suggest how these may be developed and improved. With the consent of the Treasury and the Board of Agriculture and Fisheries, the Committee was subsequently authorised by the Secretary for Scotland to extend its

**Improvement of
Poultry-Keeping in
Scotland.**

inquiry to the Lowland Districts of Scotland. The members of the Committee were Mr. James Murray, M.P. (*Chairman*), Professor R. Patrick Wright, Mr. Harry Hope, Mr. S. M'Call Smith, and Mr. Alex. M. Prain. The Report of the Committee [Cd. 4,616, price 2½d.] contains a review of the attempts made from time to time for the encouragement of the poultry industry in Scotland, together with a detailed account of its present condition.

As a result of their inquiry, the Committee regard an extension of the poultry industry throughout Scotland as of essential importance to the national welfare of the country. They point out that it is of special importance on small holdings, because it requires little expenditure of capital and brings quick and regular returns, and the work can generally be undertaken without the employment of hired labour. It will thus act as an inducement to the people to remain on the land, and will check rural depopulation. In the opinion of the Committee there are no unfavourable conditions in Scotland, climatic or otherwise, more than affect other branches of agriculture, to prevent a large increase of production similar to that which has been attained in recent times in Ireland and Denmark.

The Committee make a number of recommendations with regard to the provision of educational facilities in Scotland—such as the appointment of lecturers and instructors, the establishment of poultry departments at the agricultural colleges, and the provision of scholarships. They also recommend the allocation of a sum of not less than £300 per annum for special investigations carried out under the direction of the central authority.

With regard to production, the principal recommendation is directed to the formation of breeding centres. It is suggested that breeding centres should be established throughout the country, particularly in the Highlands. Such centres should be upon small farms or crofts, owned by the more intelligent, energetic, and progressive men, who would be willing to give special attention to the breeding of poultry, and to follow the methods recommended by the Administrative Authority. At each breeding centre only one breed of fowl or duck should be kept, which should be of a breed

selected as suitable for that district. In this way a supply of stock birds and eggs for hatching would be available.

It is proposed that a subsidy of £5 should be given to the owner of each breeding centre for the first twelve months, in addition to which he should receive a stock of twelve birds, and also houses and appliances to the value of £5, and afterwards the sum of £5 per annum should be paid to him, conditional upon his undertaking to maintain his stock in the best condition, to retain for breeding purposes an equal number of pullets, and to purchase a cockerel for an additional pen each succeeding year, to use trap-nests, to keep a careful account of expenditure and income, to allow inspection by visitors, and to act generally under the control of inspectors appointed by the Administrative Authority.

The owner of each breeding centre should undertake to sell during the months of February, March, and April selected eggs for hatching, at a price not exceeding 1s. 6d. per dozen, or to exchange eggs for hatching at the rate of twelve such eggs for twelve ordinary eggs, the Administrative Authority paying him in the latter case 1s. per dozen for all eggs thus exchanged.

It is also suggested that day-old chickens or ducklings might be distributed from breeding centres during the months of March, April, and May instead of eggs for hatching, in which case the price should not exceed 3s. per dozen; or twenty-four ordinary eggs be exchanged for each dozen chickens or ducklings, the Administrative Authority paying the owner, in the latter case, 2s. per dozen for all chickens and ducklings thus exchanged.

Owners of breeding centres should be permitted to purchase from farmers or crofters cockerels produced from eggs supplied by them, good enough for breeding purposes, with the view of exchanging with other centres and of obtaining fresh blood; or the breeding centre might give a new male bird to farmers and crofters in exchange for two of these males, or sell at a price not exceeding 4s. per bird.

The Committee also make a number of recommendations as to the methods of marketing produce. In conclusion, they observe that in order to carry to a successful issue any scheme that may be adopted for the development of the poultry

industry in Scotland, regular supervision and inspection are essential. They recommend, therefore, the appointment of a thoroughly qualified expert in practical poultry-keeping as Commissioner under the Administrative Authority, with such assistants as may be thought desirable, under whose direction and control should be placed the work over the entire country.

In 1907 the Commissioners of H.M. Woods and Forests completed the purchase of the Inverliever Estate, containing about 12,530 acres lying at an elevation between about 120 and 1,400 ft. above sea level on the north-west side of Loch Awe, in the county of Argyll. The land is occupied as sheep farms, except about 290 acres, which is under timber.

**Afforestation of the
Inverliever Estate.**

The purchase was made for the purpose of carrying out a scheme of afforestation in Scotland on scientific and economic lines, and the estate was carefully selected with a view to its suitability for this purpose. It is proposed to plant it gradually at the rate of 150 acres per annum. A forester, who will act under the general supervision of the Commissioners and reside on the estate, has been appointed.

The Board have been furnished by the Commissioners of Woods with the following statement of the progress which had been made up to April last :—

Work to the end of April has been entirely of a preparatory nature. It has been impracticable to proceed with planting in the area selected, as local labour was unobtainable, and for outside workmen dwelling accommodation was not procurable. A corrugated iron bothy has accordingly been erected at Cruachan, the most convenient spot, to accommodate twelve men, and a similar but smaller structure has been put up for the nurseryman at Ford. Shelter-sheds in the nursery and upon the site to be planted next season have also been built.

The area to be planted during the next two seasons has yet to be fenced against sheep and cattle, but the erection of the fences will be commenced almost immediately. A site for a nursery, which will eventually be about seven acres in extent,

has been selected at Ford, and this has been fenced. A part of it has been ploughed, manured, and trenched, and by the end of this season about 400,000 conifer seedlings will have been planted in it and several seed-beds sown.

A plan of planting operations for the next twelve years has been drawn up, under which not less than 150 acres per annum will be planted. The site for next season's planting has been examined with regard to the species of conifer most suited to the varying conditions of soil, moisture, exposure, &c. Clearing of valueless scrub necessary on parts of this area is almost completed. Drains have been cut through the swamps, and the draining of part of the adjoining 150 acres is in progress.

The Board of Agriculture and Fisheries have made an Order, dated May 12th, 1909, restricting the importation of wolves, jackals, foxes, wild dogs, and other animals of the canine tribe (except the domestic dog). The Order does not affect the restrictions on the importation of domestic dogs.

**Importation of
Canine Animals
Order of 1909.**

Under this Order an imported canine animal, that is to say, a canine animal which is brought to Great Britain from any other country, except Ireland, the Channel Islands, and the Isle of Man, is not to be landed in Great Britain unless its landing is authorised by a licence of the Board previously obtained, and when landed it is to be detained or otherwise dealt with in accordance with such conditions as may be inserted in any licence authorising its landing.

The Order provides penalties for unlawful landing, and extends to canine animals certain Sections of the Diseases of Animals Act, 1894.

In reference to the note which appeared in this *Journal* in March, 1909, p. 929, notifying the prohibition of importation into Natal of potatoes attacked by certain diseases, the Board have been informed, through the Colonial Office, that the disease referred to as "White Rot" corresponds scientifically to *Nectria*

**Importation of
Potatoes into Natal.**

solani; "Scab" includes *Oospora scabies* and *Sorosporium scabies*; "Black Rot" is *Chrysophlyctis endobiotica* (Black Scab or Wart Disease); "Potato tuber moth" is *Gelechia operculella* (formerly known as *Lita solanella*); and "Gall Worm" refers to the attack of *Nematodes*.

Agricultural Exhibition at Buenos Ayres.—The Board of Agriculture and Fisheries have been informed, through the Board of Trade, that an International Agricultural Exhibition will be held in Buenos Ayres under the direction of the "Sociedad Rural," from June 3rd to July 31st, 1910, on the occasion of the hundredth anniversary of the Independence of the Argentine Republic.

**Agricultural Exhibi-
tions, &c., Abroad.**

The Exhibition will comprise products of the agricultural and pastoral industries, together with machinery and other matters connected with their progress and encouragement. Cattle and all animals will be received under the restrictions set forth in the sanitary laws. Applications for space for cattle will be received up to February 10th, 1910, and for other purposes up to November 10th, 1909.

Congress for Suppression of Fraud in Food.—An International Congress for the suppression of fraud in food was held in Geneva in 1908, and a similar Congress is being arranged to be held at Paris in October, 1909. The object is the discussion and definition of methods to prevent the fraudulent adulteration of foods, and also of chemical products, pharmaceutical preparations, and mineral waters. The General Secretary of the Congress is M. Robert Fazy, 42 Rue du Rhone, Geneva, but information on the subject can also be obtained from Mr. Loudon M. Douglas, College of Agriculture, Edinburgh.

Exhibition at Odessa.—H.M. Consul-General at Odessa (Mr. C. S. Smith) has forwarded to the Board of Trade translations of an extract from the rules and of the programme of an exhibition of manufactures, arts, &c., to be held at Odessa, opening on 15th/28th May, 1910. H.M. Consul-General is informed that agricultural machinery will be accorded special privileges, to be announced later.

The above-mentioned translations may be seen by British firms interested on application at the Commercial Intelligence Branch of the Board of Trade, 73, Basinghall Street, London, E.C.

Exhibition in Austria-Hungary.—H.M. Consul at Trieste (Mr. J. B. Spence) has forwarded to the Board of Trade a copy of the programme of a proposed Regional, Provincial, and International Exhibition to be held at Capodistria from May to September, 1910. The exhibition, which is to be known as the First Exhibition of the Province of Istria, will be divided into three sections, viz., Agricultural, Industrial, and Marine.

The international portion of the exhibition will include agricultural machinery of every kind, and articles and substances benefiting agriculture (fertilisers, &c.).

The programme and regulations of the exhibition (in Italian) may be seen by British firms interested on application at the Commercial Intelligence Branch of the Board of Trade, 73, Basinghall Street, London, E.C.

Exhibition at Rostov-on-Don.—Mr. Vice-Consul St. Clair reports that an Agricultural and Industrial Exhibition will be held at Rostov-on-Don from September 10th to October 3rd next, and that a cattle and horse show will be held at the same place from September 10th to September 19th, under the auspices of the local Agricultural Society.

The exhibition will comprise sections dealing with all branches of agriculture, horticulture, and forestry, and detailed programmes may be obtained from the Office of the Imperial Don-Kuban-Ter Society of Agriculture, Exhibition Building, Rostov-on-Don, Russia.

The Administration of State Studs and the Remount Commission intend to purchase horses at the exhibition to the value of 3,500 guineas, and the Department of Agriculture has also provided a sum of about 700 guineas for purchase of thoroughbred animals. There are also a number of money prizes.

The exhibition affords an opportunity of exhibiting machinery and implements, and Mr. St. Clair makes special reference to the possibility of exhibiting refrigerating plant. He states that the question of installing refrigerating apparatus in railway waggons and at railway stations in the south of Russia for the preservation of meat seems to be attracting the attention of the Government. A bureau has been established at St. Petersburg, *i.e.*, the Russian Committee of the First International Congress for the Refrigerating Industries, 19 Konnogvardeysky Bulvar, St. Petersburg. As the Agricultural Society at Rostov appears to be greatly interested in the matter, Mr. St. Clair suggests that British firms should send their price lists and catalogues to the Imperial Don-Kuban-Ter Agricultural Society, Vistavka, Rostov-on-Don.

During the *first* week of May the weather was of quite an exceptional character. Bright sunshine was "very abundant" throughout the United Kingdom, and the rainfall over the greater part of England was "nought." **Notes on the Weather and the Crops in May.** Warmth was as a rule "unusual," but a number of sharp frosts were experienced at night. The thermometer on the grass fell to as low a point as 14° at Llangammarch Wells. The number of accumulated day degrees above and below 42° exceeded the normal for the week nearly everywhere. Although the general condition for the *second* week was not so favourable, there was very little rain, and all districts except the North-East of Great Britain experienced long periods during which the sky was nearly cloudless. In England S.W. the week was rainless, and the rainfall elsewhere was below the average. Night frosts were again common, and on the 13th and 15th some very low temperatures were recorded. For the *third* week the conditions were dry and bright, but a few showers fell in some places. The temperature, after being somewhat low for a time, rose quickly and became high in all parts of the kingdom. The highest point reached was 82° in England E. and S.E. and Midlands, but 81° was reached in England S.W. Night frosts, however, were still the rule, even in the south. The season by this time was backward, the advantage gained previously having been to some extent lost. For the *fourth* week the weather was less bright and many showers fell. Rainfall was indeed "heavy" (England S.W. "very heavy") everywhere. Sunshine was "moderate" in the Eastern section of the kingdom, "scanty" in the Western. The highest temperature recorded was 80° in England E. and the Midlands, the lowest (on grass) 22° . There were, however, no accumulated day degrees below 42° recorded.

Reports from all quarters were unsatisfactory. From North Lancashire it was reported that the dry weather prevented the grass from growing, and the want of grass caused a drop in the price of milking cows. Fruit trees were much troubled with insect pests, and the caterpillar was prevalent on gooseberry bushes. Potatoes were injured by frost. The lambing season was unsatisfactory, nearly all

farmers in that county having experienced losses, due to the poor condition of the ewes owing to the wet during the last few months of 1908. From Berkshire it is stated that the drought and cold had had a serious effect on the crops, the wheat suffering least. The rain at the beginning of June benefited both oats and barley. Another report from Berks confirms this, and adds that all farm work is now in a forward state.

Germany.—According to the Report of the Imperial Statistical Bureau referring to the middle of May, the condition of the crops was as follows:—Winter wheat, 3'1; spring wheat, 2'6; winter rye, 3'0; spring rye, 2'6; barley, 2'6; and oats, 2'7; (1=very good, 2=good, 3=medium (average); 4=small).

**Notes on Crop
Prospects Abroad.**

The weather during the previous month was not generally favourable. The area ploughed up owing to the crops not coming through the winter well amounts, in the case of winter wheat, to 10'2 per cent., of the area sown, which compares with 2'4 in 1908, 2'4 in 1907, and 38'1 in 1901. This crop made little progress during the month, the weather being against it. Spring grain is generally in fair condition though somewhat backward.

Hungary.—A despatch from H.M. Consul-General at Buda Pesth, dated May 5th last, states that the harvest prospects notified from various parts of the country were not encouraging. Spring wheat had suffered considerably in consequence of the prolonged drought, with warm, windy weather during April, which changed to sudden cold and rain on the last of the month and beginning of May. Autumn wheat is also stated to have been kept back for similar reasons in various districts. It is hoped, however, that the rain came just in time to save the country from a really bad harvest, which was reported as certain on April 29th if rain did not fall within two or three days.

According to the Report issued by the Hungarian Ministry of Agriculture in the middle of May, wheat has grown slowly, and is weak and much infested with weeds, though latterly it has improved. The unsatisfactory winter sowings have been replaced with spring wheat, and the condition of these later sowings is satisfactory.

Hop Crops of Austria and Hungary in 1908.—The despatch mentioned above also contains a statement by Mr. Sigmund Utitz, Reporter in Nuremburg to the Hungarian Ministry of Agriculture, from which it appears that Austria's hop crop in 1908 was the largest on record. The land in hop cultivation in that year was 62,649 acres, and the crop amounted to 368,953 cwt., as compared with 267,581 cwt. in 1907. The land under hops has been doubled since 1881, and the crop trebled.

In Hungary, 2,850 acres were planted with hops, giving an output of 17,899 cwt., an increase of about 10 per cent. on the previous year. Hungarian hops are said to be rising in favour in foreign markets, and at the Berlin Hop Exhibition in October last, no less than 15 prizes were awarded to Hungarian hop-growers.

Roumania.—The *Moniteur Commercial Roumain* (May 15th, 1909)

states that the recent rains have favoured the growth of crops, and winter wheat, as well as the spring wheat which was not sown late, now appears to be in excellent condition. The area sown, however, is less than in the previous year, and, according to the official statistics, only 4,112,000 acres of wheat have been planted, as compared with 4,326,000 acres in 1907. The former figure, moreover, is 345,000 acres below the average of the past five years.

Russia.—According to a despatch received from Mr. H. Cooke, Commercial Attaché, the official *Commercial and Industrial Gazette* of April 30th/May 13th, describes the state of the grain sowings of the central zone (22 governments) of European Russia up to the first week of May as equally satisfactory as in the southern region. In the south, the state of the winter crops is everywhere considered fully satisfactory, and in the central zone more evenly so than in the southern. Spring grain sowing began everywhere much later than usual, and in numerous localities had only just begun at the time of the inquiry. It was proceeding, however, under favourable conditions. There were no substantial modifications with respect to the extent of the area sown, though in some localities in the south-east the area had been extended.

India.—The final official estimate of the yield of wheat in India in 1909, exclusive of certain areas in the United Provinces, is 7,580,000 tons, as compared with 5,975,800 tons in 1908, and an average of 7,845,000 tons in the five years 1902–1906.

France.—The report of the French Ministry of Agriculture (*Journal Officiel*, May 29th) on the condition of the crops on May 1st gives the area of wheat sown as 16,155,000 acres, compared with 16,086,000 acres in 1908. The area of winter wheat shows an increase of 296,000 acres and that of spring wheat a decrease of 227,000 acres compared with the previous year. The condition was generally satisfactory, especially in the North, North-west, West, and South-west. According to a statement in the *Journal d'Agriculture Pratique* (June 3rd), there was reason to fear during the month of May that the prevailing dryness would compromise the prospects of this crop, but rain fell at the end of the month in most districts. The area under barley and oats was approximately the same as in the preceding year.

United States.—The Crop Reporting Board of the Department of Agriculture states that the condition of winter wheat on June 1st was 80·7 as compared with 83·5 on May 1st, 1909, 86 on June 1st, 1908, 77·4 on June 1st, 1907, and 80·5, the mean of the averages of the past ten years.

Preliminary returns put the acreage of spring wheat sown at 18,391,000 acres, an increase of 6·9 per cent. as compared with the acreage sown last year. The average condition of spring wheat on June 1st was 95·2, as compared with 95·0 on June 1st, 1908, 88·7 on the same date of 1907, and a ten-year average of 92·6.

The total reported area in oats is 32,422,000 acres, which shows an increase of 0·2 per cent. as compared with the estimated area sown last year. The average condition was 88·7 against 92·9 on June 1st, 1908. The acreage reported as under barley is about 3·5 per cent. larger than that estimated as sown last year, and the average condition is 90·6 as compared with 89·7 last year.

The Board of Agriculture and Fisheries have been furnished by the Board of Trade with the following report, based on about 210 returns from correspondents in various districts, on the demand for agricultural labour in May.

**Agricultural Labour
in England
during May.**

Agricultural Labourers.—Employment was regular on the whole during May, although some day labourers in certain districts lost a little time during the month. The supply of such men was in general about equal to the demand.

Northern Counties.—According to reports from *Northumberland*, *Cumberland*, and *Westmorland*, employment was generally regular during May, but the supply of day labourers was rather in excess of the demand in some districts, work being well forward. Men and boys were plentiful at the half-yearly hirings, and wages showed a downward tendency. Regularity of employment was reported from *Lancashire*, the supply of day labourers being about equal to the demand. In *Yorkshire* agricultural labourers are said to have been fully employed in most districts, although some day labourers lost a little time through rain.

Midland Counties.—Correspondents in *Cheshire* and *Derbyshire* state that potato planting, turnip hoeing, and other work afforded regular employment during May. In *Nottinghamshire* and *Leicestershire* hoeing was somewhat hindered at the beginning of the month, owing to the backward state of the crops during the dry weather. Some difficulty was reported in obtaining capable men for permanent situations. Day labourers in *Staffordshire* were generally well employed in planting potatoes, preparing the ground for root crops and other spring work, and in the Leek Union the demand is said to have been somewhat greater than the supply. There was a fair demand for extra labourers in *Shropshire*. Regularity of employment is reported from *Worcestershire* and *Warwickshire*, hoeing corn and planting potatoes affording a good deal of work for day labourers. Men for tending cattle and horses were said to be in request in certain districts. Owing to the favourable weather agricultural labourers in *Northamptonshire* were regularly employed. The supply of extra men was about equal to the demand, but difficulty is reported in obtaining men for permanent situations. Employment in *Oxfordshire* and *Buckinghamshire* was fairly regular during May. The supply of day labourers was in several districts in excess of the demand. Correspondents in *Hertfordshire* and *Bedfordshire* state that the weather was favourable for work on the land, and in several districts day labourers were in demand for hoeing.

Eastern Counties.—Agricultural employment in *Huntingdonshire* and *Cambridgeshire* was interrupted for one or two days by rain. The supply of extra men was sufficient in most districts. Regularity of employment is reported in *Lincolnshire*, day labourers finding a good deal of work in weeding the corn, hoeing peas, and planting potatoes. At the May hirings some men did not secure engagements, and wages showed a tendency to fall. The demand for lads, however, was in excess of the supply. In *Norfolk* and *Suffolk* day labourers were regularly employed, the supply being about equal to the demand in most districts reported on. Employment has been good with farm

labourers in *Essex*, the weather being favourable for hoeing and weeding, and work plentiful.

Southern and South-Western Counties.—Agricultural labourers in *Kent* have been, generally speaking, in regular employment. In *Surrey* and *Sussex* work has been a little interrupted by rain, and in certain districts a few day labourers lost time in consequence. The supply of such men was in general quite equal to the demand. In *Hampshire* employment was fairly regular, although hoeing was rather backward through the cold weather at the beginning of the month. There was no scarcity of day labourers. A report from the Droxford Union states that men for permanent situations were difficult to get. Similar reports come from *Berkshire*. Reports from *Wiltshire* and *Dorsetshire* state that outdoor work was generally regular during May. The dry weather at the beginning of the month, however, somewhat affected the employment of day labourers, the root crops not being forward enough for hoeing. In *Somerset* there was also some irregularity of employment, owing to weeding and hoeing being delayed, and the supply of day labourers was rather in excess of the demand. A scarcity of skilled men for permanent situations is mentioned in the Taunton Union. Employment was generally regular with farm labourers in *Herefordshire*, where weeding the corn, hoeing roots and potatoes, manure spreading and tending hops afforded a fair amount of work for day labourers. In *Gloucestershire* day labourers were not in much demand, farm work being reported as well forward. A scarcity of men for milking is mentioned in the Dursley Union. Agricultural labourers in *Devon* and *Cornwall* have been generally in full employment, the dry weather permitting outdoor work to be proceeded with uninterruptedly. A demand for capable men for permanent situations is reported from several districts.

Expenditure of Danish Ministry of Agriculture.—The Report for 1907-8 on the Finances of Denmark (*F.O. Reports, Annual Series, No. 4,211*) states that the ordinary expenditure

Notes from Foreign Office Reports.

of the Ministry of Agriculture in that year was £199,881, as compared with £188,704 in 1906-7. Of this increase of £11,177, about £1,110 went to fisheries, and some £1,660 to each of the following items:—Plant and seed culture, cattle and horse breeding, and suppression of sand drifts, and £1,110 to marl transport.

In addition an amount of £30,278 was charged as extraordinary expenditure, which included £9,450 for the commutation of tithes, and about £11,100 for buildings for the Copenhagen Agricultural and Veterinary High School.

The estimates for 1908-9 and for 1909-10 provided for an expenditure of £218,935 and £238,035, with an additional extraordinary expenditure of £24,672 and £18,661.

The report contains a reference to M. Alberti's frauds. The magisterial investigation has not yet been concluded, but it is supposed that

the total amount involved will be from £888,800 to £1,000,000. The principal sufferers are the Farmers of Denmark Butter Export Association and the Zeeland Peasants' Savings Bank. The Government have proposed that the State and the leading Copenhagen banks shall again intervene as at the time of the bank crisis, the State on this occasion guaranteeing £222,220 towards the re-erection of the unfortunate savings bank, but this proposal has not yet received the sanction of the Rigsdag.

Agriculture in Tampico, Mexico.—The Report for 1908 on the Consular District of Tampico (*F.O. Reports, Annual Series, No. 4,215*) states that the resources of the State of Tamaulipas are principally pastoral and agricultural. Cattle-raising is carried on all over the State; the cattle are, with few exceptions, native-bred stock, and although the natural range grasses are sufficient to keep the cattle in fair condition, there is not sufficient feed to fatten them on. The range cattle are generally driven south into the State of Vera Cruz, where excellent pasturage abounds, in order to be fattened for killing. The best cattle-raising districts are in the south and south-eastern portions of the State. The exportation of cattle to Cuba, which acquired considerable importance after the Spanish-American war, has ceased entirely, no cattle having been exported since 1906.

From the Sierra Madre Mountains to the coast at Tampico, about 80 miles away, is a gently rolling stretch of exceedingly fertile land. Through it run the Panuco, Tamuin, and Tamesi Rivers, all navigable, with their many tributaries. It is in this district that several large tracts of land have been purchased by foreign capitalists with the view of subdividing the land and selling it in lots of from 5 to 100 acres. These lands are being rapidly sold to small practical farmers, mostly Americans, who, with the use of modern implements and scientific farming methods, are producing very satisfactory results. The average price of unimproved land suitable for farming purposes is about £1 10s. per acre. For practical farmers with £200 to £500 capital this district presents many opportunities at the present time.

Expenditure of the French Ministry of Agriculture.—The Report on the French Budget for 1909 (*F.O. Reports, Annual Series, No. 4,206*) states that the Budget of the Ministry of Agriculture for 1909 amounted to £1,930,960, as compared with £1,842,624 in 1908. The main items were :—

	£
Grants in aid of farmers and subventions to agriculture ...	121,600
Bounties given for the cultivation of—	
Silkworms	200,000
Hemp	91,000
Indemnities for the destruction of diseased animals . .	52,000
Stud farms	267,506
Encouragement of horse breeding	53,040
Preservation of forests, dunes, watercourses, and hill land	189,660

The vote for this Ministry has risen by £88,337, chiefly owing to an increase of some £30,000 in the amount given as bounties for the cultivation of silkworms, of £6,000 for stud farms, and of £20,000 for indemnities for the destruction of diseased animals.

The expenditure on State forests is put at £599,824, the revenue from which is estimated at £1,401,872.

Agriculture in Southern Italy.—Some information respecting possible openings for British live stock in Italy, extracted from a Report on the Agriculture of Southern Italy (*F.O. Reports, Misc. Series, No. 673*), was given in this *Journal* (March, 1909, p. 929).

This Report also gives an interesting account of the crops and live stock, and the general character of the farming in that district.

Importation of Horticultural Produce into Italy.—The following observations are made in the above Report respecting the importation of horticultural produce. Owing to the restrictions imposed by the Phylloxera Convention, no plants or seeds can be sent direct from the United Kingdom to Italy, and consequently the trade in roses, seeds, and bulbs is all done by France and the Netherlands. The law is evaded to a certain extent by shipping these goods to agents in France for re-shipment, but this is a clumsy plan, and wastes time, which, in treating of such perishable goods, is the essence of the contract. An inspection of many acres of beetroot would at once persuade any British agriculturist that, even making allowance for the dryness of the Italian climate, much might be done by the introduction of better seed and by the use of artificial manure. Seed potatoes might also be introduced, but it must be remembered that the seed must be imported every year, as it has been found by experiment that after the first year, if the crop is raised from potatoes which have been reared in Italy from British seed, the result is disappointing, the potatoes being no better than those grown from the ordinary Italian seed.

Export of Meat from the Netherlands.—The Report for 1908 on the trade of Amsterdam (*F.O. Reports, Annual Series, No. 4,203*) gives some information respecting the crops and the exports of Dutch agricultural produce to the United Kingdom. As regards meat from Harlingen, it is noted that the trade was more satisfactory in the summer than later, when the quantity shipped exceeded the demand in the British markets, causing great losses to the trade, especially in mutton. The export of fat calves was stationary, with somewhat better results than in 1907. Bobby (new-born) calves were exported in considerable quantities to Hull, but without sufficient profit for exporters. Fewer pigs were shipped, in consequence of the competition with Flushing and the Hook of Holland, from which ports steamers are running daily, so that these routes are preferred. During 1908 the meat of 126,143 sheep, 30,622 calves, 2,435 pigs, together with 2,975 cases of offal, was exported. The general result, however, is said to be unsatisfactory. Several new slaughter-houses have been erected at Harlingen lately in conformity with the provisions of the law relating to the compulsory examination of all meat destined for export to the United Kingdom.

Agriculture in Roumania.—The Report on the trade of Roumania in 1908 (*F.O. Report, Annual Series, No. 4,219*) gives information as regards the harvest of 1908, the timber trade, and the export of cereals from Sulina and other ports on the Danube. It is noted that of the total area under cultivation, 4,677,668 acres are in the hands of 3,874 large proprietors, while the remaining 10,000,000 acres are divided among 1,033,324 small farmers. Not only has the area cultivated by large owners decreased while that cultivated by small owners has in-

creased, but the number of small farmers has increased by about 48,000 since 1906, while the large estates are less in number by 230.

Agriculture in Hungary.—The Report for 1907-8 on the commerce of Hungary (*F.O. Reports, Annual Series, No. 4,212*) states that the Government, through the Minister of Agriculture, is doing a great work for the assistance of agriculture throughout the country, especially in its great establishments for breeding horses, cattle, and pigs, which are stated to be almost unique of their kind in Europe. But apart from horses and cattle, agriculture generally may be said to be making considerable progress. It is becoming at once more intensive and more scientific, and the attention paid to by-products is of value in helping the farmers over bad years.

The harvest shows an increase on that of last year as far as wheat and rye are concerned, but a falling off in barley, oats, maize, and potatoes. The falling off in the last-named was considerable, and has now continued for two years.

There was a large increase in the number of cattle in Hungary in 1908 over 1907, the figures being 6,446,000 in 1908, against 5,953,000 in 1907, an increase of $8\frac{1}{2}$ per cent.

Other animals—horses, donkeys, mules, pigs, sheep, and goats—all show a considerable increase, the figures for pigs showing an increase of 10 per cent., and sheep an increase of $4\frac{1}{2}$ per cent. As regards cattle, the increase is especially in the line of dairy cattle rather than of beasts for slaughtering. The breed most sought for apparently for dairy purposes is the *Rotscheckige*, in which the increase amounted to 286,588 head.

Export of Flour from Hungary.—The above Report states that the falling off in the flour export was particularly noticeable and caused considerable anxiety in Hungary, where milling is one of the largest interests. The mills have for many months been working short time, and this state of things will certainly continue until well into the summer of 1909 at any rate. The decrease in 1908 as compared with 1907 amounted to about 2,400,000 cwts. There was also a heavy falling off in the exports of meal and bran.

The export flour trade shows a falling off of 40 per cent. as regards foreign countries outside the Austro-Hungarian Union; there was a decrease of 70 per cent. for the Netherlands, of about 50 per cent. for the United Kingdom and France, and 15 per cent. for Brazil. The decrease for Austria amounts to about 15 per cent. The decrease in value of this trade amounts for countries outside the Austro-Hungarian customs union to about £333,332, and for Austria to £624,999, while the reduction in the value of exported meal and bran amounts to about £416,666. Taken all together, the reduction in exported flour products may be valued at about £1,374,997.

Beans from Manchuria.—The report for 1908 on the trade of Newchwang (*F.O. Reports, Annual Series, No. 4,191*) states that a new venture has been the export of beans during the winter of 1908-9 from Tairen to the United Kingdom, to be used as food for cattle. Hitherto experimental shipments of beans from Newchwang have failed, as the beans fermented on the way. This might have been due to the beans having got wet coming down the river, either accidentally or on purpose, so as to increase the weight. The beans in Tairen, on the other

hand, as they come down by rail, arrive dry and are shipped dry, and the success of the venture may be due to this fact. It is stated that, as soon as the river opens again, shipments will also be made from Newchwang. That there are enough beans for both ports is evidenced by the fact that the South Manchurian Railway during the last winter carried daily about 6,000 tons, and yet there were huge accumulations at every station.

MISCELLANEOUS NOTES.

Sale of Bread Acts.—The Board of Trade have issued a circular to Local Authorities in Great Britain suggesting that every possible step should be taken to enforce the statutory provisions with regard to the sale of bread by weight.

The Sale of Bread Acts provide that all bread, not being French or fancy bread or rolls, shall be sold by weight, under a penalty not exceeding 40s. for each offence.

In Scotland, Section 427 of the Burgh Police Act, 1892, requires all bakers and dealers in bread to impress on all bread sold or exposed for sale, except fancy bread or rolls, the imperial weight of such bread in distinct figures.

Price of Wheat and Bread.—The Board of Trade Labour Gazette (May, 1909) contains an article on the recent rise in the price of wheat and bread, in which the various statistics bearing on the question are brought together. It is illustrated by two charts showing the price of wheat and bread from 1800 to 1908.

Cases of Anthrax in Factories.—The Annual Report of the Chief Inspector of Factories and Workshops for 1908 (Cd. 4664, price 2s. 4d.) contains reports on the cases of anthrax in factories. There was a decrease in the number of both fatal and non-fatal cases. Wool and horse-hair factories and the handling of hides and skins were responsible for most of those that were reported. Two of those that terminated fatally occurred in works in which no scheduled dangerous wool had been used for years. In several cases East Indian wool fell under suspicion, and the Medical Inspector refers to the new regulations which have been issued for the use of this material. He also mentions briefly the result of the further inquiries conducted by the Anthrax Investigation Board, and the stress laid by Dr. Eurich on the fact that, as far as wool is concerned, blood clot adhering to the fleece is the main carrier of the anthrax spores.

OFFICIAL CIRCULARS AND NOTICES.

The Board of Agriculture and Fisheries have issued a new Order, dated May 8th, 1909, and entitled, the "American Gooseberry Mildew

**American
Gooseberry Mildew
Order of 1909.**

Order of 1909," by which the previous Orders, viz.: the American Gooseberry Mildew Order of 1907, the Prohibition of Importation of Bushes Orders of 1907 and 1908, and the Local Orders, as to Kent, Essex, Shropshire, and Norwich, are revoked.

The new Order applies to the whole of Great Britain. A summary of its principal provisions is given below :—

Notification of Disease.—Section 3 provides that the occupier of any premises on which there is a bush which is, or appears to be, diseased, shall forthwith notify the fact to the Board, or to the Local Authority, and where practicable a specimen showing the disease shall accompany the notice.

Precautions to be Adopted in Case of an Outbreak.—Section 4 provides that the occupier of any garden in which disease exists or appears to exist shall as soon as is practicable spray all the diseased or suspected bushes, and all gooseberry and currant bushes in the garden to which the disease is likely to spread, with a solution of liver of sulphur (containing not less than one pound of liver of sulphur to thirty-two gallons of water); provided that this provision shall not apply to bushes which have shed their leaves.

No bush shall be moved from the garden until after the investigation required by Section 5.

All diseased fruit and all clippings from diseased or suspected bushes are to be forthwith destroyed by the occupier by burning or other effective method.

Investigation by Local Authority.—Section 5 provides that the Local Authority on receiving notice of the existence of disease shall forthwith take such steps as may be necessary to determine in what gardens the disease exists, and shall cause notice of such determination to be served on the occupier of each of such gardens, which shall thereupon become "infected premises."

The notice is as far as practicable to include in the infected premises only those parts of the garden in which there are or recently have been diseased bushes.

Action to be taken by Local Authority.—Section 6 provides that the Local Authority may at any time by a notice served on an occupier of infected premises require him to adopt such measures for prevention of the spread of the disease as are authorised by this Article and specified in the notice.

A notice under this Article may require the occupier of the premises as regards all or any of the bushes on the premises to adopt any one or more of the following measures :—

(a) To destroy on the infected premises the fruit (if any) on each diseased bush;

(b) to prune the bushes in such manner as may be directed by an Inspector of the Local Authority and to his satisfaction;

(c) at such time or times as may be specified, to spray the bushes thoroughly with a solution of liver of sulphur (containing not less than one pound of liver of sulphur to thirty-two gallons of water), or with Bordeaux mixture, or with a solution of sulphate of copper, as may be directed by the notice;

(d) to spray in like manner the ground beneath each diseased bush and the site of each bush which has been destroyed on account of disease.

The provisions in the Order will not prevent the destruction by the owner, by fire or other effective method, of any bush if such destruction takes place on the infected premises.

Where a Local Authority have consented to pay compensation for the destruction of bushes, they may require the occupier of infected premises to destroy by burning or other effective method all or any of the bushes on the premises.

All clippings arising from any pruning are to be destroyed on the infected premises by the occupier by burning or other effective method.

The next Section gives power to the Local Authority to require the adoption of precautions on premises in the vicinity of infected premises.

Section 8 provides that the Local Authority may prohibit the picking of fruit in diseased gardens except under such conditions as may be necessary, and Section 9 deals with the prevention of the spread of infection by the movement of bushes.

Prohibition of Importation of Bushes.—Section 13 prohibits the landing in Great Britain of any bush brought from any place out of Great Britain (except the Channel Islands), but this does not apply to the landing of any currant bush under the authority of a licence previously obtained from the Board of Agriculture and Fisheries.

Other sections of the Order refer to the imposition of penalties, powers of the Board, &c.

The Board of Agriculture and Fisheries have issued the following circular letter, dated May 27th, 1909, to Local Authorities in Great Britain under the Disease of Animals Acts,

Circular Letter as to 1894 to 1903 :—

Tuberculosis. **SIR,—**

1. I am directed by the Board of Agriculture and Fisheries to send to you for submission to your Local Authority the enclosed copy of the Tuberculosis Order of 1909, which will come into operation on the 1st of January, 1910.

2. As your Local Authority are doubtless aware, the subject of tuberculosis in man and in animals, and the relations between the disease in human beings and in animals, has been under careful investigation during recent years both in this country and abroad, and various phases of the question have been inquired into by successive Royal Commissions. So far as regards the possibility of the transmission of the disease from affected bovine animals to man, the Board are satisfied that it must now be accepted as a fact that tuberculosis is transmissible by the agency of milk used for human consumption. The Local Government Board concur in this view, and a Bill was introduced in the House of Commons by the President of the Local Government Board on the 25th instant, designed, *inter alia*, to afford protection to the public health from the risk of the spread of tuberculosis by the means of milk used for human consumption.

3. It appeared to the Board of Agriculture and Fisheries desirable that their Order should be made and issued at the earliest possible moment in order that the proposals of the Government as a whole with regard to tuberculosis might be placed before Parliament. The Board intend at a later stage to address a further letter to your Local Authority dealing more particularly with points of administrative detail connected with their Order. For the moment, therefore, they propose to refer only to the broader aspects of the subject.

4. In considering the question in relation to animals, the fact that the disease is communicable to man by milk has a material bearing on the measures to be adopted. Any action which results in the reduction in the number of tuberculous bovine animals in the country must reduce the risk of the spread of tuberculosis amongst the community, and if it were possible to eradicate from this country the disease in animals, a material step forward would have been taken in the campaign against the disease in man.

5. It is abundantly clear, at the same time, that any operations aiming at the diminution or eradication of tuberculosis in animals must be commenced with caution, and carried out with due regard to the extent to which the disease is believed to exist amongst cows and the importance of securing the continuance of an adequate milk supply, and also of avoiding any disorganisation of the important industry concerned.

6. The Board have accordingly decided that their first endeavour should be to secure the destruction of every cow found to be suffering from tuberculosis of the udder, and also of all bovine animals which are emaciated from tuberculosis, since these are known to disseminate freely the germs of the disease. Any cow which is proved to be giving tuberculous milk should also, in the opinion of the Board, be similarly dealt with. By such means the Board conceive that a check will be placed upon the spread of the disease, and the way cleared for any future action which may, in the light of experience, be considered necessary and practicable in the public interest. The Order accordingly deals only with the forms of tuberculosis above set out.

7. Local Authorities for the purposes of the Diseases of Animals Acts are charged with the duty of investigating reports received under Article 2 of the Order, with the assistance of a Veterinary Inspector, with a view to causing the slaughter of any animal in their District shown to be suffering from one of these specified forms of tuberculosis. Under Article 3 of the Order the Veterinary Inspector will be able to extend his examination to any bovine animals upon the premises that have been associated with a suspected animal, in order that he may at the same time take steps to deal with any other bovine animal which in his opinion presents clinical symptoms of tuberculosis; and for the purpose of assisting him in his diagnosis as regards such animals he may, but only with the written consent of the owner of the animal, apply the tuberculin test to any such animal. Power is also given to the Veterinary Inspector to take samples of milk and of fæces, urine, and abnormal discharges, the intention being that he shall make use of bacteriological methods for the purpose of diagnosis.

8. The Local Authority are required by Article 4 of the Order to cause every animal found by them to be diseased within the meaning of the Order to be slaughtered. The animal to be slaughtered is to be valued in its condition at the time of valuation. Inasmuch, however, as the clinical diagnosis made by the Veterinary Inspector prior to slaughter may not be confirmed on post-mortem examination, it is provided in sub-section (3) of Article 5 of the Order that there shall be separate valuations on the basis both of the animal proving to be affected with tuberculosis and of its proving to be not so affected, and

the amount of the compensation will depend on the result of the examination.

9. The compensation payable by the Local Authority for an animal slaughtered under their direction in cases in which the post-mortem examination does not show tuberculosis is a sum equal to the full value of the animal and a further sum of twenty shillings.

10. Where tuberculosis is found the proportion of the value of the animal payable by way of compensation to the owner is made to depend upon the extent of the disease which is present. The Royal Commission of 1898 made certain recommendations with regard to the meat of tuberculous animals (*see* pages 20–22 of their Report), and the Local Government Boards for England and for Scotland adopted those recommendations and issued circular letters in the year 1899 for the guidance of Meat Inspectors as to the degree of tubercular disease which, in their opinion, should cause a carcase of an animal, or part thereof, to be seized under the Public Health Acts. The Board of Agriculture and Fisheries have accordingly adopted this classification as a basis by which the proportion of compensation payable under their Order is to be determined.

11. The degrees of tuberculosis described in Article 7 (4) of the Order are those which in the opinion of the Commissioners justify the seizure by Meat Inspectors of the entire carcase and all the organs thereof. Wherever such conditions are certified to exist the compensation is fixed at a sum equal to one-fourth of the value of the animal or the sum of two pounds, whichever sum is greater, after deducting from this compensation one-half of the costs incurred by the Local Authority for any valuation of the animal by a valuer appointed by the Board or for any examination of its carcase by a veterinary surgeon other than the Veterinary Inspector. For convenience these conditions are described in the Order as “advanced” tuberculosis. In all other cases of disease, namely—in those where a carcase, if otherwise healthy, need not in the opinion of the Commissioners be condemned under the Public Health Acts except as regards the portions containing tuberculous lesions—the compensation is to be a sum equal to three-fourths of the value of the animal after deducting from this compensation one-half of the costs of valuation and examination as in the preceding case.

12. The Order prescribes the precautions to be taken in respect of the milk, &c., of suspected animals (Article 8), and their detention and isolation whilst under suspicion (Article 9). Provision is also made in Article 10 of the Order for dealing with suspicious animals exposed in Markets, Fairs, or Sales.

13. The Order has only been made after very careful consideration of the liabilities which are thrown upon the Local Authority. The Board believe that public opinion is favourable to the adoption of concerted measures designed to check the spread of tuberculosis throughout the country, and no such action can be satisfactory which fails to make provision for dealing with the disease in the animal. Heroic measures in this connection would only defeat their own object, but a well-devised scheme for gradually reducing the prevalence of tuberculosis in animals should, the Board feel, carry with it a full measure of public sympathy and support. The payment to agriculturists of reasonable compensation

for animals slaughtered in the public interest must, in the opinion of the Board, be an essential feature of any such scheme. On the other hand, the liability of the Local Authority to provide such compensation on the present basis from public funds is a serious one, and cannot be continued unless events show that a return commensurate with the burden imposed is being obtained. It behoves agriculturists, therefore, to second the efforts of the public authorities by themselves taking measures to eradicate the disease entirely from their herds by segregating all bovine animals which respond to the tuberculin test, so as to prevent tuberculosis from being spread within the herd, and the Board will be prepared to advise how this can best be done in particular cases.

14. The Board desire at the same time to point out to Public Health Authorities that any extension in particular localities of the measures now to be taken throughout the country generally, may prejudice their general utility. The danger to the public health from the milk of a cow presenting no clinical symptoms of tuberculosis and not giving tuberculous milk, even should it re-act to the tuberculin test, is admittedly small, and stockowners cannot be expected to pursue the course suggested above unless they are satisfied that re-action to the tuberculin test will not expose their herd to administrative action on the part of Public Health Authorities. It is earnestly to be hoped, therefore, that Public Health Authorities and their Officers will as far as practicable conform in their procedure to the lines laid down in the Board's Order.

15. It is inevitable that at the outset of the operations the expenditure of Local Authorities should comparatively speaking be heavy, inasmuch as the first effects of the Order will be to bring within its purview the cows of all ages suffering from chronic disease of the udder and bovine animals of all kinds which show signs of emaciation. When, however, the Order has been in operation for a few years there will only fall to be dealt with animals which from an outwardly healthy condition develop these forms of the disease. It must not, therefore, be supposed that the expenditure during the initial years will represent the ultimate average cost.

16. The Board would be glad if you would lay this letter before your Local Authority for their consideration in connection with the Bill now before Parliament. In view, however, of the fact that the Order does not come into operation until the commencement of next year, the Board do not think it necessary for your Local Authority at present to proceed with the publication of the Order in their District in accordance with the provisions of the Diseases of Animals Act, 1894.

I am, &c.,

T. H. ELLIOT,

Secretary.

The Board of Agriculture and Fisheries have issued an Order, dated 26th May, 1909, and coming into operation on the 1st January, 1910, entitled the Tuberculosis Order of 1909. The Order extends to England and Wales and Scotland, and the provisions, which are summarised below, are to be executed and enforced by the Local Authority.

**Tuberculosis Order
of 1909.**

Notice of Disease.—Article 2 provides that every person having in his possession or under his charge (i) any cow which is, or appears to be, suffering from tuberculosis of the udder, indurated udder or other chronic disease of the udder; or (ii) any bovine animal which is, or appears to be, emaciated from tuberculosis, shall without avoidable delay give information of the fact to the police or to an Inspector of the Local Authority. The person in possession or having charge of the animal shall forthwith take such steps as are necessary to secure compliance with Article 8 (*Precautions to be adopted with respect to Milk, &c.*) and Article 9 (*Detention and Isolation of Suspected Animals*).

Inspection and Examination of Animals.—Article 3 provides that where a Local Authority have reasonable ground for supposing that on any premises in their district there is a cow which is suffering from chronic disease of the udder or giving tuberculous milk, or a bovine animal which is emaciated from tuberculosis, the Local Authority shall cause a veterinary examination of the bovine animals on such premises to be made. The Inspector making the examination may apply the tuberculin test to a bovine animal with the previous consent in writing of the owner thereof or of his agent, but not otherwise.

Power is also given to the Inspector to enter the premises and examine any bovine animal thereon and require any cow to be milked in his presence and to take samples of the milk, and of the fæces or urine of any bovine animal on the premises, or of any abnormal discharge from any bovine animal thereon.

Slaughter of Diseased Animals.—Article 4 provides that where a Local Authority are satisfied by the report of the Inspector that in their district there is a cow which is suffering from tuberculosis of the udder, or giving tuberculous milk, or a bovine animal which is emaciated from tuberculosis, the Local Authority shall give notice in writing to the owner or person in charge of the animal and also to the Board and cause the animal to be slaughtered; provided that if the owner of the animal, or any person on his behalf, gives notice in writing to the Local Authority, or to their Inspector or other officer directed to carry out such slaughter, that the owner objects to the animal being slaughtered under the provisions of this Order, it shall not be lawful for the Local Authority to cause the animal to be slaughtered without the special authority of the Board first obtained; provided also that this special authority shall not be given in the case of any animal valued under this Order at more than thirty pounds, if and so long as the animal is detained and isolated, and the milk (if any) is dealt with in accordance with the provisions of this Order.

If the value of an animal proposed to be slaughtered, as agreed or certified under this Order, exceeds thirty pounds, the Local Authority shall not proceed with its slaughter unless so directed by the Board.

Valuation.—Article 5 deals with the valuation for compensation, which is to be arrived at either by agreement with the owner or be ascertained by a valuer appointed for the purpose.

Post-mortem examination.—This is to be made by the Veterinary Inspector of the Local Authority, or other veterinary surgeon as provided in Section 6.

Compensation.—Article 7 provides that if the Local Authority fail

to carry out the above examination, or if the certificate of such examination does not show that the animal was suffering from tuberculosis, the Local Authority are, by way of compensation, to pay to the owner thereof a sum equal to the value of the animal as ascertained under Article 5, and a further sum of twenty shillings.

If the certificate of examination shows that the animal was suffering from tuberculosis (not being advanced tuberculosis), the Local Authority are, by way of compensation, to pay to the owner a sum equal to three-fourths of the value of the animal, after deducting therefrom one-half of their reasonable costs of any valuation of the animal by a valuer appointed by the Board, and of any examination of its carcase by a veterinary surgeon other than the Veterinary Inspector.

If the certificate of the examination shows that the animal was suffering from advanced tuberculosis, the Local Authority shall, by way of compensation, pay to the owner a sum equal to one-fourth of the value of the animal, or the sum of two pounds, whichever sum is the greater, after deducting from this compensation one-half of their costs of valuation and examination as in the preceding case.

For the purposes of this Order an animal slaughtered under this Order shall be deemed to have been suffering from advanced tuberculosis (a) when there is miliary tuberculosis of both lungs; (b) when tuberculous lesions are present on the pleura and peritoneum; (c) when tuberculous lesions are present in the muscular system, or in the lymphatic glands embedded in or between the muscles; or (d) when the carcase is emaciated and tuberculous lesions are present.

Precautions to be adopted with respect to Milk, &c.—According to Article 8 the milk produced by any cow which is, or appears to be, suffering from chronic disease of the udder or emaciated from tuberculosis, shall not be mixed with other milk until the cow has been examined by a Veterinary Inspector in accordance with the provisions of this Order, and until the owner or person in charge thereof has been notified that this Article has ceased to apply to the cow; and all milk affected by this Article shall forthwith be boiled or otherwise sterilised, and any utensil in which such milk is placed before being so treated shall be thoroughly cleansed with boiling water before any other milk is placed therein.

A Local Authority may by written notice apply the restrictions imposed by this Article to the milk produced by any cow specified in the notice which is suspected of giving tuberculous milk and is being examined under this Order.

Detention and Isolation of Suspected Animals.—Article 9 provides that every person having in his possession or under his charge any cow which is, or appears to be, suffering from chronic disease of the udder, or any bovine animal which is, or appears to be, emaciated from tuberculosis, shall keep the animal isolated as far as practicable from other bovine animals, and also keep the animal in his possession or under his charge, until the animal has been examined by a Veterinary Inspector; provided that the animal may at any time be slaughtered by the owner or person in charge.

Suspected Animals in Markets, Fairs, and Sales.—Under Article 10, a Veterinary Inspector of a Local Authority may by notice served on

the owner or person in charge of a bovine animal exposed in a market, fairground or saleyard which appears to him to be (i.) suffering from tuberculosis of the udder, indurated udder, or other chronic disease of the udder; or (ii.) emaciated from tuberculosis, require the animal to be removed from the market, fairground, or saleyard to the premises from which it was brought thereto, or if the owner or person in charge so desires, to any other suitable premises, to be specified in the notice.

Cleansing and Disinfection.—This subject is dealt with in Article 11, under which the occupier of any premises on which there has been a cow suffering from tuberculosis of the udder or giving tuberculous milk, or a bovine animal emaciated from tuberculosis, is, if so required in writing by an Inspector of the Local Authority, to cleanse and disinfect at his own expense, and to the satisfaction of the Inspector, that part of any shed or other erection in which the animal has recently been placed or kept.

Other articles in the Order provide for penalties for contravention, &c.

Schemes for Manurial Experiments.—The schemes for manurial and other experiments which were submitted to the Board in 1903 by the Agricultural Education Association have recently been reprinted, and copies can be obtained free on application at the Office of the Board, 4, Whitehall Place, London, S.W.

**Recent Publications
of the
Board of Agriculture
and Fisheries.**

The object of these schemes was to lay down some general method by which the more simple problems of manuring could be approached, in the expectation that by means of trials thus carried out on the same lines in different parts of the country general or average results might be obtained.

Most of these schemes are of so simple a character, and so direct and practical in their objects as to be capable of general adoption by farmers, with a view to ascertain the needs of their own land. Thus the first experiment is directed to the manurial necessities of soils, *i.e.*, to ascertain what type of manure the soil requires most. Other experiments aim at showing the manurial requirements of meadow and grass land, of swedes, potatoes, wheat, oats, and barley, and of crops in rotation. A specimen is given of a trial designed to show the residual value of manures, and also of one to test the value of lime in preventing "finger-and-toe."

By carefully carrying out these experiments in regard to any crop, a farmer would ascertain what was the leading requirement of the crop on that particular soil, what was the effect of farmyard manure, what was the best artificial manure or mixture of manures, and other points which are so greatly affected by the character of the soil on which the crop is grown.

Report on Experiments on the Manuring of Mangolds.—This publication, which is referred to on p. 239, gives a summary of experiments conducted in Great Britain in past years in regard to the manuring of mangolds. The general results are given of trials showing the effect of farmyard manure alone, of artificial manures alone, of farmyard and artificial manures combined, and of common salt. This publication may

be obtained direct from the Office of the Board of Agriculture and Fisheries, No. 4 Whitehall Place, S.W., price 3d., post free.

Types of Horses suitable for Army Remounts.—This publication is a reprint of the article, which appeared in this *Journal*, August, 1908, and gives information as to the types of horses required for remount purposes in the Army. Copies may be obtained free from the Office of the Board.

Leaflets.—The following is a list of leaflets which have been recently issued or are in course of preparation :—No. 214.—Credit Banks; No. 215.—How to Obtain an Allotment or Small Holding; No. 216.—The Administration of the Small Holdings Acts; No. 217.—The Administration of the Allotments Acts; No. 218.—Associations for the Formation of Small Holdings; No. 219.—Glanders or Farcy; No. 220.—The Agricultural Holdings Act, 1908; No. 221.—Mutual Insurance of Live Stock; No. 222.—Meadow Saffron; No. 223.—Brown Scale of Gooseberry and Currant; No. 224.—Narcissus Cultivation; No. 225.—A New Tomato Disease; No. 226.—Broom-rape. Copies can be obtained free on application at the Office of the Board.

SUMMARY OF AGRICULTURAL EXPERIMENTS.

EXPERIMENTS WITH ROOT CROPS.

The Use of Salt for Mangolds (Jour. Roy. Agri. Soc., 1908).—As experiments in past years showed that the application of 1 cwt. of salt per acre when used with nitrate of soda as a top dressing was beneficial to the mangold crop, an experiment was conducted in 1908 to ascertain whether a larger quantity of salt would be still more beneficial. Seven plots were devoted to each of four varieties of mangold. All the plots received a dressing at the rate of 12 tons farmyard manure, 3 cwt. superphosphate, and 1 cwt. sulphate of potash per acre. In addition, plot 2 received 1 cwt. per acre of nitrate of soda as a top dressing; plot 3 had 1 cwt. of nitrate of soda and 1 cwt. of salt per acre as a top dressing; while plots 4, 5, and 6 had each 1 cwt. of nitrate of soda as a top dressing, but the quantity of salt given with the nitrate of soda rose from 2 cwt. per acre on plot 4, to 4 cwt. on plot 5, and 6 cwt. on plot 6. On plot 7, 1 cwt. per acre of "nitrolim" was applied with the other manures in the drills.

The top dressings in all cases increased the crop very materially, and the average yield of the four varieties of mangolds sown for the seven plots was :—Plot 1, 27 tons; plot 2, 30 tons 17 cwt.; plot 3, 30 tons 12 cwt.; plot 4, 34 tons 5 cwt.; plot 5, 34 tons 13 cwt.; plot 6, 36 tons 6 cwt.; and plot 7, 29 tons 7 cwt. It would appear from this that common salt may be advantageously used with 1 cwt. per acre of nitrate of soda up to 6 cwt. per acre, though there was little to choose between 2 cwt. and 4 cwt. of salt. The lowest increase was with nitrolim, the yield with which was about $1\frac{1}{2}$ ton less than with nitrate of soda.

Special Report on Experiments on Manuring of Mangolds (Board of Agriculture and Fisheries, 1909).—In this report an attempt has been made to summarise the results of past experiments in Great Britain on the manuring of mangolds. The three common methods of manuring

are considered in order:—(a) Farmyard manure alone; (b) artificial manures alone; and (c) farmyard and artificial manures combined. The action of common salt and the influence of season are also dealt with. In the different sections the various nitrogenous, phosphatic, and potassic manures are compared as regards their value for mangolds, as also are various combinations of artificials, both with and without farmyard manure. It is pointed out in the introduction that the task of preparing this summary has been a difficult one, and that it has been found impossible to do more than call attention to the facts brought out by the figures which have been examined. The experimental plots were not, as a rule, arranged in duplicate series; thus the figures gave no indication of the extent to which the yield may have been influenced by variations in the soil. When experiments are not in duplicate it is impossible to draw satisfactory conclusions from the results, unless the writer of the report has watched the crops growing and has noted every circumstance that might affect the harvest results. When the average of a large number of results is taken, errors compensate each other, but in the case of the experiments here reviewed the numbers were not sufficiently great to give results quite free from error, and some of the conclusions to which the figures seem to point must, therefore, be accepted with caution. The Report, however, is one which should be of value both to the student and to the farmer.

Manuring of Mangolds (Midland Agric. and Dairy Coll., Reports on Experiments with Crops and Stock, 1907-8).—The experiments conducted in 1907 were a continuation of those begun in 1903. During these five years all the principal practical points connected with the proper use of artificial manures for the production of mangolds have been tested, and it is considered that the results point to the following combination of artificial manures as likely to give the best results to the farmer using it in addition to farmyard manure:—Sulphate of ammonia (at seeding), 100 lb., or an amount equal to 20 lb. of nitrogen; nitrate of soda (at singling), 130 lb., or an amount equal to 20 lb. nitrogen; superphosphate (at seeding), 715 lb., or an amount equal to 90 lb. phosphoric acid; sulphate of potash (at seeding), 127 lb., or an amount equal to 60 lb. potash; and common salt (in March), 280 lb. The quantities in each case are given per acre.

Taking the 1907 trials alone, the results appear to show that it does not pay to include more than 90 lb. phosphoric acid (about 6½ cwt. superphosphate), nor more than 60 lb. potash (about 120 lb. sulphate of potash) in the dressing per acre. Both the phosphate and the potash are better applied shortly before seeding rather than in March. In a good brairding season, common salt applied at seeding time does equally well as the same applied in March.

Manuring of Mangolds (Harper-Adams Agric. Coll., Field Experiments, 1908).—Trials, which are being continued, were commenced in 1907 to ascertain what top dressings can be economically used in conjunction with a standard dressing of manure. The standard dressing was composed of 3½ cwt. dissolved bone, 1 cwt. sulphate of potash, and 1 cwt. sulphate of ammonia per acre. Top dressings of nitrate of soda and superphosphate were applied in varying quantities and in three dressings. While it is considered too early to draw definite conclusions,

the results show up to the present that both nitrate of soda and superphosphate can be used economically as top dressings for mangolds.

Another experiment dealt with the effect of potassic manures on mangolds, the value of the manure applied in each case being the same. The fertilisers selected were basic slag, superphosphate, and potassic superphosphate. Equal amounts (15 tons) of farmyard manure were applied in each case, with 8 cwt. basic slag, $7\frac{1}{2}$ cwt. superphosphate, and 6 cwt. potassic superphosphate respectively, and the yields were 48 tons 7 cwt. (basic slag), 45 tons 4 cwt. (superphosphate), and 45 tons 15 cwt. (potassic superphosphate).

Another experiment dealt with the use of salt, and confirmed the results obtained in 1907, the heaviest dressing of salt giving in both years the largest yield of mangolds. In 1908 the application of $2\frac{1}{2}$ cwt., 5 cwt., and 10 cwt. of salt gave increased yields of 7 tons 4 cwt., 12 tons 4 cwt., and 17 tons 3 cwt. respectively. The effect of salt in checking weeds was again observed, and must be reckoned as increasing the value of salt. It is particularly necessary that heavy dressings of salt should be thoroughly worked into the soil, and not merely harrowed in before sowing. An instance occurred where this was not done, with the result that the germination of the seed was much affected.

Manuring of mangold experiments were also carried out at two centres in Staffordshire, on behalf of the County Education Committee.

Manuring of Mangolds (Univ. Coll., Reading, Results of Experiments at College Farm, 1908).—Calcium cyanamide, calcium nitrate, nitrate of soda, and sulphate of ammonia were applied at the rate of $1\frac{1}{2}$ cwt. per acre to plots $\frac{1}{20}$ acre in size. As in 1907 the calcium cyanamide applied as a top dressing very greatly damaged the leaves of the young plants, which, however, recovered afterwards, and grew a good crop of roots. Nitrate of soda gave the best yield ($33\frac{1}{2}$ tons), but was nearly equalled by calcium nitrate (32 tons), while sulphate of ammonia was just equal to calcium cyanamide (both $28\frac{1}{2}$ tons).

Manuring of Mangolds (Dorset C.C., Education Committee, Report on Agricultural Experiments, 1907-8).—Experiments were carried out at two centres to demonstrate the effect of slow- and quick-acting manures, and to compare a medium with a heavy dressing.

Manuring of Mangolds (Shepton Mallet Grammar School, 9th Annual Report, 1908).—The soil on which the trial was made is stated to be naturally deficient in potash, and this was confirmed by the experiment, the plots to which kainit was applied all growing the heaviest crops. It has been found, for several years, that where the plots have not received potash the plants have been badly attacked by wireworm. The pest seems to flourish where potash is lacking, but to avoid soil which has received a dressing of kainit.

Varieties of Mangolds (Harper-Adams Agri. Coll., Field Experiments, 1908).—Trials of varieties were continued in 1908 on the College Farm, and the yields were higher than in any previous season, seventeen varieties yielding upwards of 45 tons per acre, seven of these exceeding 50 tons. These were Garton's Improved Yellow, Dickson's Imperial Tankard, Dickson and Robinson's Eclipse Red, Sutton's Prize-winner Yellow Globe, Leighton's Rentpayer, Dickson and Robinson's Defiance, and Garton's Gate Post. The first prize at the Newport

Root Show was obtained with Sutton's Yellow Globe, grown on one of the plots.

Variety trials were also conducted at one centre in Staffordshire on behalf of the County Education Committee.

Varieties of Mangolds (Dorset C.C., Report on Agricultural Experiments, 1907-8).—A number of varieties of mangolds were compared at four centres. Nine Yellow Globe varieties gave an average yield of 30 tons 2 cwt.; six Golden Tankards, 24 tons 13 cwt.; five Intermediates, 27 tons 13½ cwt.; and five Long Reds, 26 tons 15 cwt. It is pointed out, however, that mangolds vary much in composition, and a given variety is not to be chosen simply on account of a somewhat superior yield by weight. For instance, in each group, the average dry matter, which is chiefly made up of sugar, may be put approximately as follows: Yellow Globes, 11·3 per cent.; Golden Globes, 14·2 per cent.; Golden Tankards, 14 per cent.; Intermediates, 13 per cent.; and Long Reds, 14·5 per cent. Thus a 30-ton crop of Yellow Globes would produce 68 cwt. of dry matter, of which 40 cwt. would be sugar, but the same weight of Golden Tankards would contain 84 cwt. of dry matter, of which 52 cwt. would be sugar. A farmer should be guided to a certain extent by the composition of the different varieties, but at the same time he should remember that a large yield is also desirable, and that some varieties suit some soils better than others.

Varieties of Mangolds (Midland Agric. and Dairy Coll., Repts. on Expts. with Crops and Stock, 1907-8).—Six varieties were compared in 1907 at eight centres. Sutton's Prizewinner and Garton's Red Intermediate each produced over 30 tons, or 4½ tons more than Harrison's Normanton Globe and Sutton's Mammoth Long Red. They contained, however, a lower percentage of dry matter than Webb's Golden King Globe and Carter's Sugar Mangold, which, though yielding respectively only 20 tons 18 cwt. and 19 tons 16½ cwt., contained the highest percentage of dry matter. The two best in point of view of total dry matter per acre were Prizewinner (5,951 lb.) and Mammoth Long Red (5,906½ lb.). During the season 1907 mangold crops in the Midlands showed a tendency to "bolt." Prizewinner, Red Intermediate, and Normanton Globe are recommended for growth in the Midlands.

Varieties of Mangolds (Midland Agric. and Dairy Coll., Bull. No. 2, 1908-9).—Seven varieties of Mangolds were compared at eight centres in 1908, on similar lines to previous years. Here Sutton's Prizewinner yielded best, with 33 tons 3½ cwt., and Sutton's Golden Tankard, the worst, with 24½ tons. The latter variety, however, contained the highest percentage of dry matter, and Prizewinner the lowest. Estimating the value of the total dry matter at 6s. 9d. per cwt., Carter's Red Emperor produced the best crop, with a value of £17 8s. 6d. "Bolting" was again prominent with some varieties, especially Large White Sugar mangold, of which upwards of 10 per cent. of the counted plants were "runners." The trials are to be repeated, so that no definite conclusions are drawn from this year's results.

Manuring and Varieties of Swedes (Jour. Roy. Agric. Soc., 1908).—This experiment was designed to test three varieties of swedes, and to ascertain the value for the swede crop of a manure termed "basic turnip manure," which was recommended for use on land deficient in lime. The nitrogenous ingredients in the manure are derived from "nitrolim"

(calcium cyanamide). The three varieties tried were "Elephant," "Kangaroo," and "Invicta." All three plots received a standard dressing, consisting of 12 tons farmyard manure, 3 cwt. superphosphate, and 13 lb. sulphate of potash per acre. Two of the plots received per acre in addition 70 lb. nitrate of soda and 6 cwt. basic turnip manure respectively. The results showed that, whatever the manuring, Invicta was the best, followed by Kangaroo. A notable point in this experiment was that the nitrate of soda reduced the crop in each case, though the tops looked more luxuriant. The "basic turnip manure" could not be said generally to have produced any benefit over the standard dressing, though it gave some gain with the Elephant variety.

Varieties of Swedes (Harper-Adams Agric. Coll. and Staffs. C.C., Field Expts., 1908).—At the Harper-Adams College, 21 varieties were tested, in continuation of similar trials in previous years.

Manuring of Swedes (Harper-Adams Agric. Coll., Field Expts., 1908).—A comparison of various phosphatic manures was made, the quantity applied being equal to an expenditure of 20s. per acre in each case. The result of the trial was clearly in favour of bone meal, which contains, in addition to phosphates, a certain amount of nitrogen. In the case of steamed bones containing less than 1 per cent. of nitrogen, the yield was not equal to that produced by a phosphatic manure, which, being cheaper, allowed of a larger quantity of the one ingredient being applied.

In a similar way a comparison was made between superphosphate and kainit and potassic superphosphate, about 41s. being expended in each case. The purchasing power of this sum enabled a larger quantity of a mixture of superphosphate and kainit to be applied per acre, and these manures gave better results than the potassic superphosphate.

A comparison of nitrogenous manures was also made in continuation of similar trials during the previous three years. A standard dressing, containing 4 cwt. steamed bones, 3 cwt. superphosphate, and 2 cwt. kainit, was applied, with a quantity of nitrogenous manure representing the same money value on each plot. On the average of the four years there was not very much difference between 1 cwt. sulphate of ammonia, 104 lb. calcium cyanamide, and 126 lb. nitrate of soda, but the ammonia gave a slightly higher yield than the other two.

Manuring of Swedes (Univ. Coll., Reading, Results of Expts. at the Coll. Farm, 1908). Sixteen plots of one-eighth of an acre each were laid out to show the effects of various manures. It was observed that halves of plots near a hedge with tall trees yielded 35 per cent. less crop than similar halves away from the trees. Owing to an attack of "finger and toe" some of the plots were too irregular to justify weighing.

Manuring of Swedes (Midland Agric. and Dairy Coll., Report on Expts., 1907-8).—The results of the experiments at five centres in three counties in 1907 showed that a small dressing of dung and artificials gives a larger crop than when dung alone is used, either in small or large dressings. Nitrate of soda proved a better source of nitrogen than sulphate of ammonia, while basic slag and superphosphate were the best sources of phosphate. Sulphate of potash gave the greatest profit, though it was run very closely by muriate of potash and kainit. The experiments are being continued (see next page).

Manuring of Swedes (Midland Agric. and Dairy Coll., Bull. 4, 1908-9).—Trials have been carried out on the same plan at various centres during the past five years, and will be repeated in 1909, so that no final conclusions can be drawn. The results up to the present, however, show that the greatest profit has been obtained from two plots, one of which received 151 lb. sulphate of ammonia, and the other 194 lb. nitrate of soda, with the addition in both cases of 502 lb. superphosphate and 58 lb. sulphate of potash. Applying all the artificials at seeding has so far given better results than when a portion has been held back until the time of singling.

Varieties of Swedes (Midland Agric. and Dairy Coll., Repts. on Expts. with Crops and Stock, 1907-8). Field trials have been carried out for some years at one or two centres, and in 1907 ten varieties were compared on six farms. On the whole, bronze-top varieties gave better yields than the purple-top varieties. Sharpe's No-Plus-Ultra gave the largest yield of roots and of dry matter per acre. The dry matter in the several varieties was fairly constant, only in one case (Pioneer) falling below 8 per cent., and in one case (Imperial) rising above 9 per cent. The latter variety was the only one that produced "bolted" roots.

Manuring of Turnips (Aber. and N. of Scotland Coll. of Agric., Bull. No. 10, 1909).—Experiments were undertaken in 1907 at sixteen centres. In a comparison of the effects of sulphate of ammonia, calcium cyanamide, and nitrate of lime at eleven centres, the respective yields were 16 tons 12 cwt., 15 tons 17 cwt., and 17 tons 3 cwt., nitrate of lime yielding somewhat better and calcium cyanamide somewhat smaller results than sulphate of ammonia. Calcium cyanamide was in all cases applied with the seed, on which it appeared to have no detrimental effect.

A trial was made to ascertain the best quantity of superphosphate. A larger crop was obtained by the heavier dressings in each case (2½, 5, and 10 cwt. being applied), but apart from the residual value the increase in the crop did not cover the extra cost.

In a comparison between high grade and low grade basic slag, the average figures indicate that there is little difference, there being an increase of only 5 cwt. in favour of the higher grade. The quantities used were 5 cwt. of the higher grade (37.56 per cent. phosphate) and 9 cwt. of the lower grade (20.77 per cent. phosphate), equivalent amounts of phosphates being present. While the cost of the lower grade slag was £1 14s. 6d. and the value of the crop £6 10s. 4d., the cost of the high grade slag was 2s. 4d. less and the value of the crop 2s. more. There is some reason to think that the low grade slag proved more effective on land which requires liming, by reason of the greater proportion of lime it contains. It is suggested that land deficient in lime should receive low grade slag, but on this point further investigation is necessary.

The effect of distillery fertiliser was also tested, a complete dressing of manure costing 37s. 6d. per acre being compared with the quantity of distillery fertiliser which could be purchased for the same money. The result was unsatisfactory on account of the difference in the ingredients of the two dressings. The distillery fertiliser proved inferior to the mixture as a producer of turnips, though it had a distinct manurial value,

COLONIAL AND FOREIGN EXPERIMENTS.

Effect of Storage on Wheat and Flour (Experimental Farms, 1908 : App. to Rept. of Canadian Minister of Agric.).—The Report of the Cerealist (Mr. C. E. Saunders, B.A., Ph.D.) states that it is well known that some increase in baking strength usually takes place when wheat or flour is stored for some months. Eight examples are given, two of wheat and six of flour kept for twelve months, all of which showed an improvement in strength and most of them in colour. In some cases the change was very marked, as in Downy Riga, the baking strength of which rose from 80 to 103; in the others the rise varied from 5 to 11 points, while in a few flours examined (not included in the eight above-mentioned) little or no change was observed. It seemed probable that both the rapidity and the amount of improvement were characteristic of each particular variety, and the trials appear to show that the gain in baking strength is more rapid in flour than in wheat, but the change takes place in both cases and reaches the same limit in the end.

Mr. Saunders points out that this increase in the commercial value of wheat or flour owing to the rise in baking strength during storage is an important matter, and in the event of part of the Canadian wheat being exported by some Northern route ten or twelve months after harvest, the increase in value might cover the cost of storage. He estimates that Red Fife showed a gain in value equal to 6 cents per bushel, and Downy Riga a gain of 23 cents.

It is hoped that the increased value of wheat which has been stored for a considerable time will be more fully recognised, and that an enhanced price will be obtained for it.

Feeding Experiments with Pigs (Mastungsversuche mit Schweinen. Bericht des Deutschen Landwirtschaftsrats an das Reichsamt des Innern, 1908).—This report by Professor Kellner, of the Mockern Experiment Station, deals with a series of experiments carried out, with the assistance of the Ministry of the Interior, on 17 farms in Germany. The food selected for investigation was the potato, and as this requires the addition of some more or less albuminoid food, the main object of the experiment was to ascertain what addition of albuminoids was necessary to give the best result when feeding potatoes to pigs.

Each experiment was carried out with two lots of pigs, 3-5 months old and as nearly as possible alike, one lot being given a highly albuminoid ration and the other a ration low in albuminoids, with varying quantities of potatoes. The food was analysed, and the animals weighed at intervals.

Although certain general lines of feeding were prescribed, there was considerable variation in the way the individual experiments were carried out, so that the results were not entirely comparable.

They are regarded, however, as showing that steamed potatoes are an excellent food for pigs, and can be given to growing animals at all stages to the extent of 50-60 per cent. of the digestible carbo-hydrates. Still greater proportions may be given if the animals show signs of appetite and care is taken to make the food as a whole attractive.

An increase above the normal quantities of digestible albuminoids proved of no advantage with quick-growing, fattening pigs; a decrease of 15-20 per cent. in the albuminoids led with animals of this type to a

distinct diminution in the increase in live weight and to an increased consumption of carbo-hydrates. Only where a slow process of fattening with poor food was aimed at could the albuminoids be reduced below the normal without disadvantage.

The proportion of digestible albuminoids to be given in a "normal" ration per 1,000 lb. live weight was as follows:—

Weight of Animals.					Digestible Albuminoids.	
Lb.					Lb.	
44	...	...	...	...	6	2
110	...	...	...	...	4	5
143	...	...	...	...	3	5
198	...	...	...	...	3	0
286	...	...	...	...	2	4

Some particulars are given of the estimated cost of feeding per 100 lb. of live weight increase.

Composition of Bordeaux Mixture (*Prak. Blätter für Pflanzenbau, March, 1909*).—This publication contains some observations on experiments by Herr F. W. Kelhofer to improve the keeping qualities of Bordeaux mixture. It was found that with a mixture of a neutral character, or giving only a slight alkaline reaction, the addition of 10–20 grammes per hectolitre ($\frac{1}{3}$ oz. to $\frac{2}{3}$ oz. per 22 gallons) of sugar was sufficient to prevent the decomposition of the mixture for over a year. The quantity of sugar is dependent on the proportion of lime; for example, mixtures composed of 1, 2, or 3 kg. of lime to 2 kg. of sulphate of copper per 100 litres of water would require respectively 20, 30, and 40 grammes of sugar. These quantities are equal approximately to an addition of 3 $\frac{1}{2}$, 6 $\frac{1}{2}$, and 9 $\frac{1}{2}$ oz. of sugar respectively to a mixture containing 10, 20, or 30 lb. lime to 20 lb. sulphate of copper per 100 gallons. The sugar should be added immediately the mixture is made, or at least within 24 hours. If experience proves that this method works satisfactorily in practice, it would have the advantage of enabling gardeners and small growers who require to use only small quantities of Bordeaux mixture at a time to make up a sufficient supply to meet their needs for some months instead of making a fresh mixture for each application.

THE CORN MARKETS IN MAY.

C. KAINS-JACKSON.

The chief facts of the wheat trade for May are, in the first place, that it has not been influenced by market transactions in America as was the trade of April, and in the second place, that it has not witnessed a decline in values. In the market for feeding stuffs, there has not been any noticeable falling off in demand, despite the advance of the season, and in consequence there has not been any decline in prices. The one positive element in which the situation is markedly changed from a month ago is in the very heavy shipments of the new Argentine maize crop. At the end of April maize supplies on passage were inadequate to meet prospective requirements; whereas at the end of May they amounted to 1,200,000 qrs.

Wheat.—Home-grown grain during May has averaged more than forty shillings per quarter at the chief statute markets, and the mean price in London shows an advance on April. The best averages have been found, as a rule, in the Thames valley, at Mark Lane, in Essex, Kent, and Suffolk. Mark Lane has had a most meagre supply of home-grown wheat, the Essex and Suffolk wheat producing districts sending up extremely little, as their local markets were bidding up to the London terms. The sales at the statute markets in the west and north, moreover, show that the exhaustion of the crop of 1908 is general, and not confined to the south or east. The backward state of the growing wheat adds to the difficulties of millers, for they cannot anticipate new deliveries into their mills for the usual dates. Many country mills shut down at the middle of May, and many more at Whitsuntide. This will affect the supply of milling offals, and may cause local difficulty in obtaining middlings and bran.

Foreign wheat supplies have not been quite equal to the demand, and stocks, which were small, are believed to be now at one of the lowest figures ever recorded since the country became a large importer. The Argentine ports have been contributories of a large percentage of what has been received, and fortunately for our mills the wheat from the River Plate shows both variety and a generally good level of milling value. Hard wheat, rich in dry gluten, is grown in the hotter States, while a softer, finer, and whiter type more like good English is cultivated in the cooler regions, which lie between the Plata estuary and the Bay of St. Matias. This mixes well with sorts stronger in gluten. The price of the northern La Plata has ranged from 44s. to 45s. 6d. per 480 lb. natural weight, that of the southern sorts from 45s. to 47s. per 504 lb. natural weight. It will be seen that the southern product often reaches the natural weight of good Kent or Norfolk grain. Russian wheat at 46s. and upwards for winter, 45s. or thereabouts for spring, has been in more request than supply. The American sorts have been in small spot supply, but with increased shipments in the last fortnight of May the arrivals about midsummer should be more adequate. The three chief sorts of Manitoba have been in fair evidence at about 47s. for No. 1, 46s. for No. 2, and 45s. for No. 3. Shippers have sent very little inferior Manitoba, but poultry owners have been eagerly inquiring for feed wheat at 40s., so that the idea of it not paying to ship wheat below milling grade should be regarded as obsolete. The Liverpool market has had a small quantity of Chilian on sale at 9s. 1d. per cential, but London has lacked this item. Durum at about 44s. per qr. has become decidedly scarce, as has the winter wheat of Alberta. The total shipments of wheat for May have not exceeded needs for consumption, and have fallen below what had been anticipated as the result of the important rise in price in April. The largest single shipper was Russia, whose exports are returned at 1,561,000 qrs. A good deal of this is only very loosely to be called a shipment as the figures include cross-frontier sales to the German and Austro-Hungarian Empires. Consequently the quantity of Russian wheat on passage is apt to appear oddly small in proportion to the month's exports. North America shipped 749,000 qrs., South America 1,396,000 qrs., Roumania and Bulgaria 429,000 qrs., India

340,000 qrs., and Australasia 353,000 qrs. There were on the last day of May 2,878,000 qrs. on passage, as compared with 3,244,000 qrs. on the last day of April.

Flour.—The price of Town Households is quite stationary at 34s. per sack, and Whites of town make are at 37s., or from the country at 33s. per sack. The production of a good quartern loaf at 6d. should present no difficulties. American sorts have fetched 35s. 6d. for the very finest, 29s. for the poorest. Kansas patents have been priced at 33s. 6d. to 34s., and Iron Duke at 30s. to 30s. 6d. per sack. Australian flour is quoted at 34s. on Mark Lane, but 33s. is accepted for parcels on passage. The market for Hungarian is dearer than ever, and trade is almost at a standstill. North America in May shipped 289,000 sacks, or 42,000 sacks less than in April. The higher prices in England, therefore, have completely failed to increase American competition on our flour markets. There are now 156,000 sacks on passage.

Barley.—Averages on sales of British barley are now difficult to strike owing to the small quantities brought to market. At Mark Lane only two averages in the month were returnable; these would give an average of 26s. 7d. per qr. The ordinary buyer found no English produce offering at that price, 27s. to 30s. being the range. But there is always a certain sale of inferior feeding barley for grinding and other purposes, and these sales have, of course, to be returned. The few barley samples showing on the Old Corn Exchange have been mostly discoloured; coarse skinned lots, but robust grain, weighing 448 lb. These make good poultry food. Foreign barley has included a liberal supply of Russian, for which 22s. 6d. has been asked and obtained throughout the month. Rarer offerings have been of Persian at about a guinea, of Karáchi at 22s., of North African at 24s. to 28s., and of Californian Barley at about 34s. per quarter. The scarcity of Anatolian, which is useful for steeping, &c., has been an inconvenience all this season. Barley shipments from Russia for May were 1,825,000 qrs. No other country shipped as much as a hundred thousand qrs. The quantity on passage on the last day of the month was only 350,000 qrs., Russia's large exports having been absorbed by buying for the Continent to an extent unusual in the trade.

Oats.—The average price made for British oats in London during May has been decidedly higher than in April, and from 1st of Jan. to the end of March there was a slow but progressive advance, with the exception of a decline at the end of February. The London market in the great majority of years shows this movement, and oats, for which 18s. is accepted on New Year's Day, may normally be regarded as saleable at Midsummer for a guinea. It ought to pay to hold the staple, but not in the expensive port warehouses. There is now in June, with the great Horse Show at Olympia, a special demand for seasoned 336 lb. to 352 lb. oats, and very good prices, 22s. to 26s., are offered. A cargo of the splendid heavy New Zealand oats which steadily command 24s. to 24s. 6d. at Mark Lane would be a most timely arrival at the end of any May. The quantities of light oats from Argentina recently received have been rather large, but after a dull fortnight the market has rallied, even for this inferior stuff. Even 304 lb. oats command fully 18s. per qr. May shipments were 491,000 qrs. from South America and 900,000 qrs. from Russia.

Maize.—Imports have been much below requirements, and stocks at the end of the month were so extraordinarily reduced that a premium of 3s. to 4s. per qr. was paid on the 24th and 25th for grain with guaranteed delivery before the Whitsuntide holidays. The Argentine new crop shipments during May amounted to 1,737,000 qrs. as compared with 1,566,000 qrs. in May, 1908, and 216,000 qrs. in May, 1907. It is curious to reflect to what price maize in June might have mounted had the Argentine surplus, instead of surpassing 1908, fallen as low as that of 1907. The maize now on passage has, in the case of the Argentine quota, which is 80 per cent. of the whole, been acquired at about 26s. per qr. The prices at which there are offers for future shipment are about 25s. 9d. for July, and 25s. 6d. for August, but remoter dates are not cheaper than August. The total shipments of May from countries other than Argentine were North America 431,000 qrs., Russia 277,000 qrs., Roumania and Bulgaria 459,000 qrs. The last-named item includes, by favour and for market convenience, Salonica and Sea of Marmora shipments.

Pulse.—Soy beans are now developing into a large and important trade with Great Britain. The bean is rich in oil and gives a good chemical analysis generally. If Japan can ship these beans all the way to London and sell them for a profit at 30s. per 504 lb. on Mark Lane, their value for feeding purposes is clear, both English and Egyptian beans being quoted at 34s. to 36s. per 504 lb., and the allied staples, peas and lentils, being dearer than either English or Egyptian beans. The sale at present is perhaps largest of soy bean oil, at 21s. per cwt. in April, but 22s. is now demanded. The sales of pulse at the end of May included Smyrna beans at 32s. per 480 lb., Egyptian lentils at 40s. per 504 lbs., Canadian peas at 7s. 10d. per cental, and Indian white peas of the new crop at 7s. 2d. per cental.

Oilseeds.—Linseed and rapeseed are an improving market, but cottonseed is more depressed than for a very long period. Contracts can be secured at 7s. per cwt. for November shipment of the new Egyptian crop, and the buyers at this price may easily make large profits. It is, of course, impossible to set forth the exact, or even the approximate, chances, but the winter and early spring demand for cottonseed cake is so large and steady that it is likely to prove advantageous to acquire a good stock of the raw material before 1909 is out. The prices asking for linseed at the end of May were 44s. to 46s. for Indian (410 lb.), 43s. to 44s. for Argentine (416 lb.). The ordinary type of rapeseed known as Brown Calcutta (416 lb.) commanded 42s., while newly arrived cottonseed from Egypt was quoted at seven guineas per ton for cash on a whole cargo; £7 10s. a little less in wholesale. The May shipments of linseed were 604,000 qrs. from Argentina and 221,000 qrs. from India, while 183,000 qrs. were on passage on the last day of the month.

Farm Seeds.—With May this branch of business falls into a state of lethargy until the early autumn. Closing prices of the month were about 60s. for good red cloverseed, 70s. for cowgrass, 22s. for mustard seed, 10s. for canary seed, 11s. for hempseed, 80s. for cocksfoot, 23s. for Timothy, 77s. for Lucerne, and 24s. for Italian ryegrass, all per cwt.

Minor Staples.—Owing to the extreme scarcity of British grain it has been very difficult to make up a good poultry mixture, and at

Mark Lane, where that term has also a technical application, the coincident scarcity of maize and dari has been felt as a serious drawback. A relatively good market has existed for sorghum and other sorts of millet, while the Indian products like Dhoil, Muttor, Kasári peas, and so forth would have sold well if the offerings had been at all adequate. The minor staple which is most neglected in proportion to its intrinsic value is perhaps rye. At 31s. per 480 lb. for a good selected sample, we have an excellent feeding stuff at three farthings per lb. In the present state of the corn markets this is not to be neglected.

THE LIVE AND DEAD MEAT TRADE IN MAY.

A. T. MATTHEWS.

Fat Cattle.—The season for the production of grass-fed beef started under unfavourable conditions. There was a great deficiency of moisture in the soil, while east winds and frosty nights prevented the grass from starting. Consequently, there is no doubt that a considerable number of bullocks were sent to market early in the month which otherwise would have been allowed a few weeks for finishing in the pastures. Some markets began to show signs of the exhaustion of the supplies of stall-fed cattle in the falling off of the proportion of first quality, but, on the whole, there has been little to complain of on this score, and the condition of the cattle exposed has been quite up to the average for the time of year. The supplies of foreign cattle slaughtered at ports of landing have been very moderate, especially of those of the better class, which indeed were rather scarce, and this has tended to maintain values for all home-bred cattle of good quality. During the first week there was an average advance of about 1d. per 14 lb. stone, taking 25 of the principal markets quoting first quality Shorthorns. This, however, did not extend to second quality. The market at Islington on May 3rd was not visibly affected by the demand for a warranty by the butchers, as was feared might be the case. An arrangement was made with the bankers to indemnify buyers against loss by seizure on payment by the sellers of one shilling per head for bullocks, but not cows.

Very few complaints came to hand during the second week of either the numbers or condition of bullocks at the larger markets, such as Carlisle, Derby, Hull, Nottingham, Preston, Salford, Shrewsbury, &c., while at Norwich it was the largest show of the season. At all the above, to which we may add London, there were plenty of good cattle of first quality, but trade was a little dragging at several of them, and was reported worse at Basingstoke, Denbigh, Derby, Ipswich, London, Newcastle, Norwich, Shrewsbury, Truro, Castle Douglas, Glasgow, and Inverness. On the other hand, Darlington, Hull, Leeds, Lincoln, and others sent more cheerful reports, and, on striking an average for 23 markets for first quality Shorthorns, the price came out at 8s. 1½d. per stone, or only a small fraction less than that of the first week. Prices for this class of cattle were singularly even throughout the country. The highest quotation was 8s. 5d. at Ashford and Newport, the lowest being 7s. 9d. at Norwich. The following week there was quite a general rebound, and 29 markets out of 40 reported improvement; best Shorthorns came out at 8s. 3½d., or a clear

average rise of 2d. per 14 lb. on the week. At Ashford, Newport, and Newcastle the price touched 8s. 9d., or 7½d. per lb., Norwich, Ipswich, and Lincoln being lowest at 8s. per 14 lb. One of the most striking features of the fat cattle trade of May was the relative cheapness of these great markets in the Eastern counties, there being frequently a good margin for dealers' profit between them and London, whereas for a long period last year prices were far higher at Ipswich than at Islington.

London market on the 24th was very moderately supplied, there being 890 fat beasts on offer, most of which were of excellent quality. Yet the trade was disappointing, and the market cleared very slowly at a reduction of fully ¼d. per lb. No market in England reported any advance during the last week of the month, and a few, including Leicester, Norwich, Peterborough, and Wakefield, were lower, but the great majority reported a very good trade at former rates. The average price of prime Shorthorns at 22 markets was 8s. 3d. per 14 lb. stone, or about 7d. per lb., while second quality was 7s. 6d., or about 6½d. per lb. During the month prices were very firm. In fact, Shorthorns rose 1½d. per stone in the four weeks.

With regard to comparative values of the various breeds of cattle, Shorthorns are here taken because they are far more widely spread than the other breeds, and therefore form a more reliable index of the market movements than more local breeds; but it may be mentioned that in the last week of May Herefords in four markets averaged no less than 8s. 7d. per stone for first quality, Devons, 8s. 4d. in five markets, and Polled Scots, 8s. 7d. in six markets.

Fat Calves.—The trade for veal calves was fairly steady throughout the month, and there was a good demand for the best quality, especially in the great country markets. The average price for prime calves at 23 markets was 8½d. per lb., with rather a wide range of values. Ashford (Kent) was the highest in the last week at 9½d., against 7½d. in London. Prices at Islington are dominated by the large supplies of fine Dutch carcasses always on offer at Smithfield.

Fat Sheep.—The reports of the first week's markets showed a continuance of the upward movement which marked the month of April. Nineteen out of 39 markets were described as showing more or less improvement, against nine which were drooping. Taking the average of 14 markets which quoted shorn "Downs," the price was within a fraction of 7½d. per lb., or very nearly ¼d. per lb. higher than the last week in April. With the exception of Chichester, where the term "Down" is applied to the Sussex breed, the dearest markets for clipped tegs were Newcastle and Wellington, where they fetched 8½d. per lb., Bristol being the lowest at 6½d., while London was slightly below the average at 7½d.

In the second week there came a lull in the trade, and reports spoke of lower prices. There was a much larger supply at Islington on the 10th than usual, by fully 2,000 head, and this of course affected prices, which had to be quoted lower, "Downs" of first quality going back to 7½d. per lb. In the country about 14 markets were reported as being against sellers, and only six claimed any advance. Still, taking 15 markets where shorn "Downs" were quoted, the fall on the week only averaged about one-third of a farthing per lb. Sheep classed as "Long-

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meats " averaged 6½d. per lb. for first quality shorn tegs, and second quality a fraction over 6d. in 15 markets. Shorn Cheviots were recorded as fetching an average of 8½d. per lb. at five English markets.

The following week a slightly weaker demand became evident, and some markets reported a worse trade, especially for heavier weights. On taking the average of 15 markets, "Downs" showed a further decline of about ½d. per lb., reducing the general average to 7½d. per lb. The month closed with fat sheep once more at a discount. At Islington, on the 24th, heavy sheep could hardly be moved at all, and the market quite failed to clear. The comparatively small number of Down tegs weighing not more than 64 lb. found customers at 7½d. per lb., but large numbers of fine tegs exceeding 80 lb. could not have been sold without a heavy sacrifice, and were therefore reserved for other markets. Out of 17 English markets two quoted ¼d. per lb. advance for "Downs," but the general average for best quality was 7½d. only, and 6½d. for second. In 15 markets-sheep classed as Longwools averaged 6¾d. per lb.

Fat Lambs.—The lamb trade was fairly steady throughout the month. Choice small ones were not very plentiful the first week and made 11d. per lb. at Islington, and as much as 1s. 1d. at Carlisle and Leeds. The great Northern markets continued firm in the following week, and 1s. per lb. was still occasionally touched at Hull, Newcastle, and Preston. In the third week, supplies considerably increased and prices fell in many places to the extent of 1d. per lb. At the close of the month Whitsuntide gave the trade a certain stimulus, but 11d. was the top price in England, and the average for first quality at 30 markets was 10½d. per lb.

Fat Pigs.—The month commenced with a good demand for both bacon pigs and porkers, and weak markets were the exception throughout. In some places the supply was insufficient for requirements. The average price of bacon pigs in 30 markets of Great Britain the first week was 6s. 9d. per 14 lb. stone, and in the last week it had advanced to 6s. 10½d., prime pigs at Birmingham reaching 11s. per score.

Carcass Beef.—The remarkable steadiness of the trade in Scotch, English, and port-killed beef which characterised the April markets was continued throughout May, the fluctuations in those classes being very small. The best Scotch short sides advanced to 7d. per lb. on the 20th at the London dead-meat market, but this was the highest point touched. Scotch long sides fetched 6½d. on the same day, but fell back to the old level of 6¼d. at the end of the month. The highest point reached for first quality English sides in London was 6d. per lb., but they failed to maintain that price, falling to 5¾d. at the end, American port-killed being quoted virtually the same as English throughout. There was much more fluctuation in the value of chilled, both American and Argentine, especially as regards the latter. American hind quarters started at 6¼d., advanced to 6¾d., and finished as low as 6d. Argentine rose from 4½d. to 5¾d., but fell back to 4¾d., per lb. This fall at the end of the month was attributed to the sudden change of the weather, and many descriptions of meat fell heavily from that temporary cause. Frozen beef somewhat improved in value, first quality hind quarters advancing ¼d. per lb. during the month, and reaching 3¾d. Fore-quarters were purchasable in any quantity at 2½d. per lb. On the whole, it may be said that there was some shortage during May in the supply of

the best imported beef, both alive and dead, but that of lower grades was more than equal to the demand.

Carcase Mutton.—There was a considerable rise in the value of British mutton in the first few days, Scotch and English tegs advancing $\frac{1}{2}$ d. per lb. Very small Scotch, in some instances, went up to 8d., but fine wethers were worth $7\frac{1}{2}$ d. English tegs realised up to 7d. at Smithfield. These prices, however, were of brief duration, and fell the following week. There was a partial recovery in the third week, but, as with beef, the trade suffered very severely during the closing week from the sudden heat, when prices gave way and sellers accepted any reasonable offers to clear.

Carcase Lamb.—The trade was very irregular and uncertain, and complaints of the weakness of the demand were very common in London. At the beginning of the month prices at Smithfield were 10d. to $10\frac{1}{2}$ d. per lb., and this was the cheapest market quoted in the official returns. Prices remained fairly steady till the 20th, but on the 26th business in lamb at the Central market was almost at a standstill, the best English being quoted as low as $8\frac{1}{2}$ d. per lb; the finest frozen lamb was worth $5\frac{1}{2}$ d. per lb.

Veal.—With abundant supplies of Dutch, of extremely various quality, London prices were much lower than those ruling in the great provincial markets. In the first week first quality English was worth 6os. 8d. per cwt. in London, against 79s. 4d. at Liverpool, 74s. 8d. at Manchester, and 65s. 4d. at Birmingham. Prices varied from 7d. to $7\frac{1}{2}$ d. per lb. for prime English at Smithfield during the remainder of the month.

Pork.—The trade, though in smaller compass, was very steady at $5\frac{1}{2}$ d. to $6\frac{1}{2}$ d. per lb., supplies being very moderate.

THE PROVISION TRADE IN MAY.

HEDLEY STEVENS.

Bacon.—During the month of May, all markets have experienced abnormal conditions. The arrivals from all points have been below the average, and a genuine scarcity has come about, resulting in a steady advance in prices, so that by the end of the month all hog products are on a high level, which has caused a falling off in the consumption. Prices generally show advances over those prevailing at the same time last year of from 10s. to 14s. per cwt., and in the case of Canadian singed sides the extreme premium over last year is as much as 21s. per cwt.

Advices from America report that hogs are arriving at their markets a little more freely, but the home demand has so increased that the surplus for export is very small, and is likely to be until the summer season demand is over.

The arrivals from Canada show a still further diminution this month, and English dealers who for some years past have been regularly using Canadian singed sides are now educating their buyers to replace them with either Irish or Danish, and some are paying a little higher price, and are handling English. Danish has not participated to the same extent in the advanced prices during the month, as the unusually warm weather, especially during the last few days of May,

has made dealers very timid of operating to any extent in this light cured class of meat, which must be consumed immediately to be palatable. Killings in Denmark have been less for the month.

Unfortunately, the English and Irish pig-growers are not in a position to take full advantage of the high prices current for imported goods, having killed a lot of their breeding stock, and in some cases the English curers have great difficulty in filling even a portion of their requirements, although willing to pay advanced prices. During the month some curers in the West of England have purchased pigs in the eastern counties, which means a heavy carriage bill.

Cheese.—During the month the sentiment entirely changed, and by the end of the second week, prices of Canadian and New Zealand had advanced several shillings per cwt., chiefly on account of the small stocks of Canadian on hand. Stocks in Canada being practically cleared, and with the large arrivals of New Zealand being absorbed, no great reduction in prices is anticipated for some weeks, the warm weather and high prices for hog products having considerably increased the consumption of cheese.

The competition in Canada for the early fodder makes has again been very keen on English account, and in consequence high prices have been paid, everything being cleared up at the end of the month on a basis of 60s.—61s., c.i.f. Some time about the middle of the month 12½ cents per lb. was paid to the farmers at some of the Canadian markets, which is 2½ cents per lb. above that which pays him a handsome profit, namely, 10 cents (5d.) per lb.

The estimated stocks of Canadian cheese at the three principal distributing centres (London, Liverpool, and Bristol) at the end of the month were 63,000 cheese, against 83,000 at the same time last year, and 78,000 two years ago.

Stocks of old cheese are also about cleared up in the United States, and the new fodder makes are realising much the same prices as in Canada.

English cheese has experienced a good demand, and the stocks of "old" have been very much reduced. A good fodder make is in progress.

Butter.—The exceptionally dry weather during May caused butter to advance in price, which gave operators more confidence, and stored stocks have been considerably reduced. The new arrivals of New Zealand and Australian have cleared steadily during the month at advancing prices. In Canada the supplies of new butter are increasing daily, and prices are down to 21 cents to 22 cents per lb.

The near arrivals from Siberia are expected to be considerably above those of last year, the season is two weeks earlier, and it is estimated that the make will show an increase of 20 to 25 per cent., the increased quantity probably reaching England during June.

Butter is still high in the United States, there being a scarcity of best grades, which are realising 27 cents to 28 cents (1s. 2d.) per lb.

At the end of the month, Irish was more freely marketed, and with the general rains lower prices are anticipated.

Eggs.—There has been a good trade in eggs throughout the month, chiefly in Irish and French. The Continental demand continues good, so that there are few left over for export.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and SCOTLAND
in the Month of May, 1909.

(Compiled from Reports received from the Board's Market
Reporters.)

Description.	ENGLAND.		SCOTLAND.	
	First Quality.	Second Quality.	First Quality.	Second Quality.
FAR STOCK:—	per stone.*	per stone.*	per cwt.†	per cwt.†
Cattle:—	s. d.	s. d.	s. d.	s. d.
Polled Scots	8 5	7 11	39 5	36 3
Herefords	8 5	7 8	—	—
Shorthorns	8 2	7 6	38 5	35 6
Devons	8 5	7 9	—	—
	per lb.*	per lb.*	per lb.*	per lb.*
	d.	d.	d.	d.
Veal Calves .. .	8½	7½	8½	7
Sheep:—				
Downs .. .	7½	6½	—	—
Longwools .. .	6½	6½	—	—
Cheviots .. .	8½	7½	8½	7½
Blackfaced .. .	8	7½	8	6½
Cross-breds .. .	7½	6½	8½	7½
	per stone.*	per stone.*	per stone.*	per stone.*
	s. d.	s. d.	s. d.	s. d.
Pigs:—				
Bacon Pigs .. .	6 11	6 4	6 7	5 10
Porkers .. .	7 3	6 9	7 0	6 3
LEAN STOCK:—	per head.	per head.	per head.	per head.
Milking Cows:—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk ..	21 1	17 11	21 15	17 11
—Calvers .. .	20 10	17 13	20 2	16 16
Other Breeds—In Milk ..	17 15	14 7	18 5	15 18
—Calvers .. .	13 7	11 10	19 10	15 19
Calves for Rearing .. .	2 5	1 15	2 15	2 1
Store Cattle:—				
Shorthorns—Yearlings ..	10 2	8 9	10 10	8 9
—Two-year-olds ..	14 9	12 10	15 3	12 12
—Three-year-olds ..	17 14	15 6	17 0	15 3
Polled Scots—Two-year-olds ..	—	—	16 4	13 11
Herefords— ..	15 13	13 18	—	—
Devons— ..	14 17	13 8	—	—
Store Sheep:—				
Hoggs, Hoggets, Togs, and Lambs—	s. d.	s. d.	s. d.	s. d.
Downs or Longwools ..	42 0	36 7	—	—
Scotch Cross-breds ..	—	—	32 2	26 3
Store Pigs:—				
Under 4 months .. .	26 3	19 11	24 3	18 11

* Estimated carcase weight.

† Live weight.

**AVERAGE PRICES of DEAD MEAT at certain MARKETS in
ENGLAND and SCOTLAND in the Month of May, 1909.**

*(Compiled from Reports received from the Board's Market
Reporters.)*

Description.	Quality.	London.	Birming- ham.	Man- chester.	Liver- pool.	Glas- gow.	Edin- burgh.
		per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
BEEF:—							
English	1st	55 0	55 0	56 0	—	58 6*	57 6*
	2nd	53 6	52 0	52 6	—	55 0*	52 6*
Cow and Bull	1st	41 0	49 0	48 6	44 6	46 6	44 6
	2nd	34 0	44 0	43 6	38 6	40 0	37 6
U.S.A. and Cana- dian:—							
Port Killed	1st	55 0	54 0	54 0	55 0	53 0	—
	2nd	50 6	49 0	51 6	50 0	50 0	—
Argentine Frozen—							
Hind Quarters..	1st	34 0	34 0	34 0	33 0	33 6	34 6
Fore	1st	21 6	23 6	22 0	21 6	23 6	23 6
Argentine Chilled—							
Hind Quarters	1st	48 6	49 6	49 0	48 6	49 6	49 6
Fore	1st	29 6	29 6	31 0	29 6	33 0	30 0
American Chilled—							
Hind Quarters—	1st	60 0	61 0	60 6	60 0	58 6	62 0
Fore	1st	35 6	39 0	37 6	37 6	36 0	39 0
VEAL:—							
British	1st	65 6	65 6	72 6	77 0	—	—
	2nd	59 6	60 6	65 6	71 6	—	—
Foreign	1st	64 0	—	60 6	60 6	—	64 0
MUTTON:—							
Scotch	1st	73 0	—	76 0	76 0	71 6	67 6
	2nd	66 0	—	70 6	70 6	65 6	57 0
English	1st	62 0	65 6	70 6	69 6	—	—
	2nd	56 6	58 6	63 0	63 6	—	—
U.S.A. and Cana- dian—							
Port killed	1st	—	—	—	—	—	—
Argentine Frozen	1st	26 6	23 6	22 6	23 6	23 6	24 0
Australian	1st	21 6	22 6	21 0	21 0	23 6	—
New Zealand	1st	30 6	—	—	—	—	—
LAMB:—							
British	1st	92 0	91 0	93 6	93 6	99 6	89 6
	2nd	86 6	86 6	87 6	85 0	—	—
New Zealand	1st	48 0	48 6	45 6	46 0	50 0	53 0
Australian	1st	36 0	38 0	35 0	34 6	37 6	—
Argentine	1st	41 0	37 6	34 6	34 0	34 0	42 0
PORK:—							
British	1st	59 6	62 6	60 6	60 0	58 6	54 0
	2nd	54 0	57 6	56 0	56 0	55 0	47 0
Foreign	1st	59 6	55 0	56 0	56 0	—	49 0

* Scotch.

AGE PRICES of British Corn per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1907, 1908 and 1909.

Weeks ended (in 1909).	WHEAT.						BARLEY.						OATS.					
	1907.		1908.		1909.		1907.		1908.		1909.		1907.		1908.		1909.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Jan. 2 ...	26	0	35	1	32	0	23	11	26	9	26	7	17	3	18	4	17	4
" 9 ...	26	1	35	2	32	9	24	2	26	9	26	11	17	4	18	3	17	5
" 16 ...	26	1	35	5	32	8	24	1	27	1	27	1	17	5	18	5	17	5
" 23 ...	26	2	35	6	33	2	24	5	26	11	27	3	17	5	18	5	17	8
" 30 ...	26	3	35	0	33	0	24	4	26	11	27	6	17	5	18	4	17	9
Feb. 6 ...	26	6	34	3	33	4	24	5	26	9	27	7	17	7	18	3	17	10
" 13 ...	26	7	33	1	33	8	24	1	26	9	27	8	17	7	18	0	17	11
" 20 ...	26	10	32	6	34	1	24	2	26	5	27	11	17	9	17	11	18	0
" 27 ...	26	9	30	11	34	5	24	2	26	3	28	0	17	9	17	8	18	0
Mar. 6 ...	26	8	30	5	34	10	23	11	26	1	27	11	17	11	17	8	18	2
" 13 ...	26	10	31	3	35	8	24	2	26	0	28	4	18	0	17	10	18	2
" 20 ...	26	10	31	7	35	9	24	0	26	2	28	0	18	1	17	11	18	5
" 27 ...	26	8	31	4	36	0	23	9	25	10	28	0	18	2	17	10	18	6
Apl. 3 ...	26	9	31	3	36	5	24	3	25	5	27	10	18	3	17	9	18	8
" 10 ...	26	8	31	2	37	4	23	9	25	10	28	0	18	6	17	7	18	10
" 17 ...	26	8	30	11	38	7	23	3	26	1	27	8	18	7	17	7	19	2
" 24 ...	26	10	30	10	41	4	23	3	25	5	28	2	18	9	17	9	19	9
May 1 ...	27	0	31	6	42	5	23	6	25	8	27	10	19	3	18	0	20	0
" 8 ...	27	6	32	4	40	9	24	0	25	5	27	7	19	7	18	4	20	3
" 15 ...	28	4	33	1	41	6	23	10	24	9	27	3	20	1	18	7	20	6
" 22 ...	29	7	33	8	42	8	24	3	25	9	27	0	20	5	18	10	20	11
" 29 ...	31	4	33	5	42	6	24	0	24	6	26	3	20	8	18	8	21	0
June 5 ...	32	0	33	1	43	1	24	7	25	10	25	7	20	7	18	4	21	3
" 12 ...	31	10	32	7			24	7	24	5			20	11	18	4		
" 19 ...	31	4	32	0			24	11	24	2			20	9	18	5		
" 26 ...	31	2	31	5			24	6	24	0			20	8	18	7		
July 3 ...	31	3	30	11			24	8	23	11			20	11	18	7		
" 10 ...	32	0	30	5			24	10	24	4			20	11	18	5		
" 17 ...	32	6	30	7			24	6	23	1			21	1	18	5		
" 24 ...	32	11	31	5			27	3	26	5			20	8	18	6		
" 31 ...	33	2	31	10			26	4	24	4			21	2	18	7		
Aug. 7 ...	33	5	31	6			26	6	23	1			21	3	18	9		
" 14 ...	33	6	31	6			25	9	23	10			20	4	18	1		
" 21 ...	33	7	31	2			25	0	24	5			19	8	17	10		
" 28 ...	33	10	30	10			24	6	24	5			18	11	17	1		
Sept. 4 ...	31	11	30	10			24	2	25	5			17	7	17	3		
" 11 ...	31	4	31	5			24	4	25	11			17	6	17	6		
" 18 ...	31	5	31	7			25	0	26	0			17	6	17	3		
" 25 ...	31	8	31	5			25	3	26	8			17	8	17	2		
Oct. 2 ...	32	6	31	7			25	5	26	11			17	9	17	2		
" 9 ...	33	3	31	5			25	9	27	5			17	11	17	0		
" 16 ...	34	4	31	2			26	3	27	6			18	0	17	0		
" 23 ...	35	9	30	11			27	2	27	5			18	7	16	11		
" 30 ...	36	3	30	8			27	7	27	5			18	10	16	11		
Nov. 6 ...	35	10	30	11			27	8	27	6			18	10	17	0		
" 13 ...	35	1	31	2			27	8	27	4			18	8	17	0		
" 20 ...	34	7	31	10			27	5	27	3			18	9	17	3		
" 27 ...	34	7	32	3			27	5	27	2			18	7	17	5		
Dec. 4 ...	34	7	32	7			27	1	27	2			18	6	17	4		
" 11 ...	34	8	32	8			27	0	27	0			18	5	17	4		
" 18 ...	34	9	32	9			27	1	26	9			18	3	17	3		
" 25 ...	34	6	32	2			26	10	26	8			18	0	17	2		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lbs.; Barley, 50 lbs.; Oats, 39 lbs. per Imperial Bushel.

AVERAGE PRICES of Wheat, Barley, and Oats per Imperial Quarter in FRANCE, BELGIUM, and GERMANY, and at PARIS, BERLIN, and Breslau.

	WHEAT.		BARLEY.		OATS.	
	1908	1909.	1908.	1909.	1908.	1909.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
France: April	38 9	40 1	25 11	26 9	19 9	22 0
May	38 8	42 5	25 11	27 4	19 9	23 4
Paris: April	38 5	40 6	26 2	23 3	19 3	20 11
May	38 5	45 4	26 2	23 3	19 3	24 0
Belgium: March	32 9	37 1	26 3	26 4	20 8	20 3
April	33 8	40 6	26 5	26 8	20 9	22 4
Germany: March	44 5	47 8	29 1	30 8	22 4	23 11
April	44 4	50 3	28 6	31 7	21 10	25 1
Berlin: March	44 7	49 5	—	—	22 6	24 9
April	44 8	51 11	—	—	22 4	25 0
Breslau: March	43 7	44 3	29 4 (brewing)	31 6 (brewing)	20 5	22 5
			27 9 (other)	26 0 (other)		
			28 6 (brewing)	32 6 (brewing)		
			26 5 (other)	26 0 (other)		
April	42 8	47 11			20 1	23 8

NOTE.—The prices of grain in France have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*, the Belgian quotations are the official monthly averages published in the *Moniteur Belge*, the German quotations are taken from the *Deutscher Reichsanzeiger*, the prices for the German Empire representing the average of the prices at a number of markets

AVERAGE PRICES of British Wheat, Barley, and Oats at certain Markets during the Month of May, 1908 and 1909

	WHEAT.		BARLEY.		OATS	
	1908	1909	1908	1909	1908	1909.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
London ..	33 4	42 9	25 2	26 9	19 5	20 11
Norwich	32 7	41 10	26 1	27 9	18 4	20 5
Peterborough	32 9	41 7	25 4	25 7	18 3	20 6
Lincoln...	32 9	41 1	25 4	25 7	18 4	21 2
Doncaster	32 2	40 10	26 2	28 6	18 3	20 8
Salisbury	32 8	42 11	26 4	27 7	17 9	20 6

**AVERAGE PRICES of PROVISIONS, POTATOES, and HAY at certain
MARKETS in ENGLAND and SCOTLAND in the Month of
May, 1909.**

(Compiled from Reports received from the Board's Market Reporters.)

Description.	London.		Bristol.		Liverpool		Glasgow.	
	First	Second	First	Second	First	Second	First	Second
	Quality	Quality	Quality	Quality	Quality	Quality	Quality.	Quality.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
BUTTER :—	per 12 lb	per 12 lb	per 12 lb	per 12 lb	per 12 lb	per 12 lb	per 12 lb	per 12 lb
British	13 0	12 0	13 9	12 3	—	—	14 0	—
	per cwt	per cwt	per cwt	per cwt	per cwt	per cwt	per cwt	per cwt
Irish Creamery	107 6	104 0	108 0	105 6	105 0	102 6	105 6	101 6
„ Factory	—	—	97 6	93 0	92 6	86 6	—	—
Danish	113 0	111 0	—	—	114 0	112 0	113 0	—
Russian	99 6	97 0	103 6	88 6	102 6	93 6	102 0	94 6
Canadian	—	—	98 0	96 0	—	—	—	—
Australian	100 0	98 0	102 0	94 0	—	—	103 6	98 0
New Zealand	104 0	102 0	106 6	101 0	105 0.	103 0	106 0	—
CHEESE :—								
British—								
Cheddar	83 6	73 0	76 6	69 0	75 6	72 0	60 6	58 6
	120 lb	120 lb			120 lb	120 lb		
Cheshire	75 6	61 6	—	—	66 6	61 0	—	—
	per cwt	per cwt			per cwt	per cwt		
Canadian	68 0	66 6	67 0	64 6	65 6	62 6	62 6	—
BACON —								
Irish	76 0	71 6	77 0	72 0	76 0	71 0	72 0	67 6
Canadian	69 6	67 6	68 6	66 6	67 6	65 0	68 6	66 6
HAMS :—								
Cumberland	101 6	86 0	—	—	—	—	—	—
Irish	100 0	94 0	—	—	—	—	99 0	90 0
American (long cut)	59 6	58 0	58 0	55 6	59 0	55 6	60 6	58 6
EGGS :—	per 120	per 120	per 120	per 120.	per 120	per 120.	per 120.	per 120.
British	9 4	8 6	8 9	8 4	—	—	—	—
Irish	8 7	7 10	8 0	7 3	8 0	7 6	7 11	6 10
Danish	9 2	8 1	—	—	8 4	—	8 7	7 2
POTATOES :—	per ton	per ton.	per ton	per ton	per ton	per ton.	per ton.	per ton.
Langworthy	71 6	60 0	70 0	62 6	85 0	80 0	56 0	50 0
Scottish								
Triumph	65 0	58 6	66 0	61 0	51 6	46 6	—	—
Up-to-Date	66 0	52 6	68 6	60 0	51 6	46 6	39 6	35 6
HAY :—								
Clover	83 6	66 6	72 6	—	85 0	65 0	75 0	70 0
Meadow	73 0	56 6	65 0	—	—	—	60 0	57 0

DISEASES OF ANIMALS ACTS, 1894 to 1903.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

DISEASE.	MAY.		FIVE MONTHS ENDED MAY.	
	1909.	1908.	1909.	1908.
Swine-Fever :—				
Outbreaks	223	344	738	899
Swine Slaughtered as diseased or exposed to infection ...	2,215	1,258	6,987	4,179
Anthrax :—				
Outbreaks	137	123	622	532
Animals attacked	155	140	827	710
Foot-and-Mouth Disease :—				
Outbreaks	—	—	—	3
Animals attacked	—	—	—	112
Glanders (including Farcy) :—				
Outbreaks	49	82	268	350
Animals attacked	192	247	1,037	1,179
Sheep-Scab :—				
Outbreaks	39	19	448	625

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

DISEASE.	MAY.		FIVE MONTHS ENDED MAY.	
	1909.	1908.	1909.	1908.
Swine-Fever :—				
Outbreaks	18	29	28	92
Swine Slaughtered as diseased or exposed to infection ...	237	565	354	1,771
Anthrax :—				
Outbreaks	1	1	3	4
Animals attacked	1	1	3	7
Sheep-Scab :				
Outbreaks	20	16	273	260

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[NOTE.—The receipt of *annual* publications of foreign agricultural and other departments, experiment stations and societies is not noted in the monthly list of additions to the Library

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THE JOURNAL

OF THE

BOARD OF AGRICULTURE.

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JULY, 1909.

AFFORESTATION OF CATCHMENT AREAS.

The supply of water obtained from land forming a "catchment area" is materially affected by the planting of trees. It has been found that the moisture in the soil underlying trees is much better conserved than it is in open country, so that more water drains from a wooded area than from one devoid of trees; while, in addition, the flow is maintained more equably throughout the year, thus tending to prevent floods on the one hand, and water-famines on the other. In addition to the direct improvement of these areas in point of suitability for the supply of water, the sale of timber may become after a time a relatively important source of revenue.

These considerations induced the Departmental Committee on British Forestry in 1902 to recommend that the attention of Corporations and Municipalities should be drawn to the desirability of planting with trees the catchment areas of their water supply, and in communicating this recommendation to the Local Authorities the opportunity was taken to ascertain some particulars as to the area and character of their catchment areas. These particulars were given in this *Journal*, November, 1904, p. 468; and with a view to ascertain what steps have been taken since that date, the Board of Agriculture and Fisheries have recently asked the Local Authorities principally concerned for an account of any work in the direction of planting the areas under their control which has since been carried out.

The result of the inquiry shows that in the majority of cases, even where Local Authorities are in possession of the freehold, or have long leases of their catchment areas, very little progress has yet been made. In a few cases, on the other

hand, the work has been taken up seriously, and planting is being done on a systematic plan.

Leeds.—The catchment area of the Leeds Corporation is situated in the Washburn Valley, and extends to over 11,700 acres, varying from 350 ft. to 1,550 ft. above sea-level, and lying on the Millstone Grit overlaid with Boulder Clay. The work of afforestation was begun here with a view to give work to the unemployed, and has been carried out for three seasons with men drawn from the Unemployed Bureau, assisted by a few permanent men. In 1908-9, however, a permanent staff was engaged, though planting by the "unemployed" is to be continued. In all 514 acres have been planted, and a further 141 acres are being planted this season (1908-9), 115 acres by the unemployed and 26 acres by the staff.

The average cost for the three seasons for preparing the land, draining, fencing, and planting, including expenditure on the nursery, was £11 19s. 5d. per acre, but the Waterworks Engineer, Mr. C. G. Henzell, observes that the cost of planting should not have been more than £7 10s. to £8 10s. per acre, the excess being due to the employment of inexperienced men.

Much of the work was badly done, and the failures have been quite 30 per cent. The men were not accustomed to spade-work, and few were able to stand the rough weather.

The permanent staff are now engaged in replanting the gaps caused by dead trees in the existing plantations, the number of trees requiring to be replaced being 551,000.

The planting has been done with Beech, Ash, Oak, Alder, Sycamore, Scotch Pine, Spruce, and Larch. The Larch has not been at all successful, and more than 30 per cent. of the plants are dead. The Scotch Pine and the hardwoods have done very well, but the Spruce has not been so satisfactory. No insect pests have been noticed except a slight attack of Larch Aphis (*Chermes laricis*).

Mr. Henzell, in his Report to the Corporation for 1908, observed that the work of afforesting the drainage area was of great importance, and suggested that 100-150 acres should be planted annually. To do this it was estimated that a permanent staff of ten men, used to spade-work and experienced

in planting, would be needed, together with six additional men in the planting season, to be drawn from among the small tenants on the estate. The men during the summer months would be employed in keeping up the nursery, cutting down the growth round the young trees, putting up fencing, &c.

Liverpool.—According to evidence given before the Royal Commission on Coast Erosion by Mr. Joseph Parry, Engineer-in-Chief to the Liverpool Corporation Waterworks, the Corporation possesses two catchment areas: one at Rivington, in South-West Lancashire, covering an area of 10,000 acres on the Millstone Grit formation, and the second at Vyrnwy, in Montgomeryshire, with an area of nearly 23,000 acres. The work of afforestation on these areas has been mainly undertaken with a view to utilise the ground, and at the same time to prevent any pollution in the water supply.

Operations at Rivington were begun about 1904 with an experimental area of about 600 acres, and in 1908 408 acres had been actually planted. At Vyrnwy the area actually planted (in 1908) was 400 acres, and, in addition, there were a number of old woods covering some hundreds of acres. Nurseries have been established at both places, which are now able to supply the trees required for planting.

The average cost of planting has been about £6 per acre, but this includes some expenditure which will not be necessary in future.

Mr. Parry has furnished the Board with the following general statement of the afforestation work carried out by the Liverpool Corporation since the year 1904:—

The top water of Lake Vyrnwy is 825 ft. above Ordnance Datum, and the catchment area around the lake rises, by slopes generally moderate, to a height of over 2,000 ft. At the north-west end the slopes are steeper and in places precipitous. The Silurian rocks around the lake are of a slaty nature, and disintegrate into a loamy soil, which is retentive of moisture.

The number of trees of various species planted in the plantations round Lake Vyrnwy since the year 1904 and up to June 30th, 1908, have been as follows:—Larch, 203,600;

Douglas Fir, 131,225; Spruce Fir, 163,100; Silver Fir, 20,000; Scotch Pine, 36,500; Corsican Pine, 176,425; Weymouth Pine, 39,070; Austrian Pine, 5,200; Oak, 7,600; Ash, 2,700; Sycamore, 9,350; Beech, 105,300; total, 900,070.

The planting for the year 1908-9 was completed early in May. The area planted was 117 acres, and the number of trees was 326,000 (including the filling of blanks), making a grand total planted since 1904 of 1,226,070.

The total amount spent on the nurseries and plantations at Lake Vyrnwy (including fencing) last year was £1,467 15s. 8d., but a considerable amount of this was incurred in clearing scrub from old abandoned woods and in drainage of peat lands.

The Rivington reservoirs are situated in Lancashire between the towns of Bolton and Blackburn, and the total area of the gathering ground is 10,000 acres.

The Corporation decided to commence planting this area in the year 1904, and the work is now proceeding at the rate of between one and two hundred acres per annum.

The following general statement has been prepared by the Forester (Mr. McBeath):—

The land planted on the Rivington watershed is nearly all, in the northern part, in the parishes of Tockholes and Withnell, and extends to 420 acres. This land was formerly let as grazing land. The soil varies from peat to a peaty loam and stiff clay. In places it overlies the Millstone Grit, and varies in depth from a few inches to two feet or more. About 200 acres of these lands form the sides of the Roddlesworth Valley, covering well-drained slopes facing S.W. to W. and N.E. to N.

About 42 acres of this were pit-planted. Casual labour was employed from the village, and pits were opened by contract at 1s. 8d. per 100; a few good workmen earned 5s. per day, while many others did not earn 2s.; 3,000 pits were opened to the acre, and four-year-old plants, Beech, Oak, Ash, Sycamore, and Spruce, were put in.

The Spruce was planted along the sides of the plantations next the reservoirs, to prevent leaves from blowing into the water, at a cost of £8 5s. per acre, including enclosing and purchase of plants.

An area of 156 acres was notch-planted with two-year seedlings of the same species, and the cost per acre, including purchase of plants, was £2 11s. The workmen employed on this plantation were young men and boys trained in forest work.

Another area of 36 acres was notch-planted, and the turf was skimmed off 14 in. square before notching to prevent the grass from smothering the plants. Turfs were taken off by contract at 7d. per 100. The cost per acre was about £3 inclusive.

A portion of high-lying moorland covering 186 acres was planted with Spruce and Beech at a cost of £3 10s. per acre, including fencing.

These plantations vary in height from 550 ft. to 900 ft. above sea-level, and are all exposed to strong winds. At the commencement of the work the planting was done mostly during the autumn and early spring, but from experience gained on the ground it has been found that late spring planting gives much better results. During the first two years all the plants were purchased, but they have to a large extent been since replaced with plants from the Corporation nurseries. Of the Beech that were purchased, very few are now alive. The cost of filling vacancies in the first year's work with four-year-old plants has been heavy compared with areas planted with home-raised plants. Very few deaths occur in the plantations made with plants from the home nurseries.

Voles or shrews are doing great damage to the plantations, and it is found that Beech and Sycamore suffer the most. A great many of the plants are barked completely round, and some are cut through. Rabbits are also troublesome on the moor, but no attacks of insect pests have been experienced. The total number of trees planted up to May 31st, 1908, was 1,540,535.

Manchester.—The catchment area of the Manchester Corporation Waterworks is situated at Thirlmere, in Cumberland, and covers about 11,000 acres, at elevations varying from 500—3,000 ft. The Corporation have consulted Professor Fisher, of Oxford University, who has drawn up a scheme for systematic planting, and they have also engaged a competent woodman to carry out the work. According to evidence given

plantations of 38½ acres in all have been planted at a total cost of £401, or about £10 7s. per acre. Four-year-old trees have been put in 4 ft. apart, and the cost of the various items has been as follows :—

	£	s	d.
Supplying and planting	191	12	6
Cost of fencing	161	12	6
Labour for erecting fencing	36	18	1
Carting, &c	11	7	5
	<hr/>		
	£401	10	6

Heywood.—Trees have been planted on one acre of the catchment area, and there is a probability of further planting being done this year.

Cardiff.—According to a report made by the Waterworks Engineer to the Cardiff Corporation, about half-an-acre of land at Rhubina was planted in 1904 with Larch seedlings, and about 4 acres at Cantreff were planted with seedlings of Scotch Pine, Larch and Spruce, and with Austrian Pine 1½–2 ft. high. The situation at Rhubina was specially favourable, and the trees are now, after five years' growth, from 10 to 15 ft. high, and there have been practically no losses. The ground at Cantreff, although at an elevation of 1,000 ft. above sea-level, was also favourable for planting, and good progress has been made there. In the autumn of 1906 some 8 to 10 acres of the mountain on the west side of the "Beacons" Reservoir were planted. This site was not so favourably situated as the others, and considerable loss has been experienced, but on the whole it is considered that the trees are doing fairly well for an exposed position 1,400–1,500 ft. above sea-level. A favourable opportunity for planting on a somewhat larger scale and in a good position will shortly occur when possession of some additional land is obtained, and it is proposed to plant some 20 acres annually.

Derwent Valley.—The Derwent Valley Water Board, after obtaining the advice of Professor Somerville, of Oxford University, have undertaken the planting of 38 acres of land in five separate plantations, and the work is now in progress. About two acres have been set aside for a nursery.

Plymouth.—The catchment area of the Plymouth Corporation covers 5,360 acres, of which 348 acres (116 water) are freehold. No planting has been done since 1904, but before that date two attempts were made on a small scale to plant

trees on the land owned by the Corporation surrounding the reservoir. These attempts, however, were only partially successful, failures being due to several reasons:—(1) Rabbits, which played havoc with the young Larch; (2) neglecting to cut down the undergrowth, which tends to choke the plants; (3) shallowness of the soil in places immediately overlying the rock; and (4) fires from passing locomotives. Where the trees were well planted and survived for two or three seasons they have grown well, but in one case 50,000 Larch were planted of too small a size, and more than half of these have disappeared.

Torquay.—The catchment area of the Torquay Corporation Waterworks is 2,241 acres, of which 105 acres were woodland in 1904. The Torquay Water Engineer, Mr. S. C. Chapman, states that since that date the afforestation work has consisted principally in rearing young trees for future use. The total area planted has been $24\frac{3}{4}$ acres, consisting of $4\frac{1}{2}$ acres of Oak and Ash mixed, and $20\frac{1}{2}$ acres of Larch and Scotch Pine. With the exception of the Oak and Ash, which were purchased at 27s. 6d. per 1,000, the trees have been taken from the Corporation's own nurseries.

The establishment of the nurseries has proved of great advantage, as there is not only a saving in cost, but the trees do better, as at planting only a few hours elapse between the time the trees are removed from the nurseries and the time they are placed in the ground in their permanent positions. The seedlings are purchased at 2s. 6d. to 3s. per thousand, and planted close together in rows 2 ft. apart. The total outlay till they are ready for planting out is estimated at 15s. per thousand, made up as follows:—Seedling Larch or Scotch Pine, 3s.; cartage, 6d.; planting, 3s.; weeding (three years), 6s. 6d.; fencing, 1s.; supervision, 1s.; total, 15s.

The cost of planting in 10-acre lots with trees set 5 ft. apart is £5 13s. 3d. per acre—viz., cost of trees, £1 6s. 3d.; labour, £1 15s. 3d.; wire fencing, £2 11s. 9d.; total, £5 13s. 3d. Ordinary estate labourers are employed at $4\frac{1}{2}$ d. per hour.

The fencing of the plantations with a rabbit-proof netting is found to be an absolute necessity. The fence now used consists of 42-inch galvanised wire-netting, $1\frac{1}{4}$ -inch mesh,

18 gauge, stiffened by means of a galvanised seven-strand wire No. 8 gauge, and supported upon angle iron standards 9 ft. apart, and with straining pillars 120 ft. apart. The wire netting is sunk into the ground for a depth of 6 inches.

The presence of the high Devonshire hedges affords great protection from the wind, and where this protection is not available the plantations are edged with Scotch Pines, which materially shelter the Larch. The protection afforded by the hedges is most clearly shown, and the height of the trees decreases in a marked degree as the distance from the hedges increases. The elevation of the plantation is 800-900 ft., and the best results have been obtained on the slopes sheltered from the N.W. wind.

The growth of the trees varies considerably, and when a dry spring has come after the planting out, the trees have made little progress during the first year. The number of dead trees has been small, except in one or two instances when rabbits have gained access to the plantations in time of snow. The cost of replacing dead trees is approximately 20s. per 1,000 for labour only, but may vary slightly according to the number to be replaced in any plantation. The presence of disease has not been noted in the Larch or Scotch Pine, but the gall-fly has appeared on the Oak trees.

The number of seedling Larch planted in 1908 was 60,000, and fencing was ready for planting 24 acres of Larch.

The planting of from 20 to 30 acres annually is apparently contemplated until land which is at present unremunerative is covered. The Town Clerk of Torquay observes in this connection that the Council would like to do more in the direction of planting their land with trees, but are prevented from doing so owing to lack of available funds.

THE INTERNATIONAL AGRICULTURAL INSTITUTE.

The International Agricultural Institute was established at Rome in 1905, and an account of its formation, and of the objects aimed at, appeared in this *Journal* in June, 1906 (p. 129). A Parliamentary Paper has now been issued which supplies information as to the steps which have since been taken in regard to its establishment. This publication con-

tains a report by Sir Thomas H. Elliott, K.C.B., who was one of the British delegates to the General Assembly of the Institute, together with the correspondence which has passed between the Board of Agriculture and Fisheries and the Foreign Office on the subject.*

By the munificence of His Majesty the King of Italy, a beautiful building has been erected for the purposes of the Institute in the grounds of the Villa Umberto I., formerly the Villa Borghese. This building contains large rooms for meetings in the central portion, while the wings contain the offices, library, and the rooms which will be occupied by the foreign delegates. It was opened by His Majesty in person on 23rd May, 1908, and subsequently the Permanent Committee held several meetings at which the work of the Institute was discussed, and various sub-committees were appointed.

The first meeting of the General Assembly was held on November 27th, and of 91 delegates who had been appointed by their respective Governments nearly all were present. His Excellency Signor Tittoni, the Italian Minister for Foreign Affairs, was elected President, and the Hon. Sydney Fisher, Canadian Minister of Agriculture, and his Excellency M. Yermoloff, Secretary of State and a Member of the Council of the Russian Empire, were appointed Vice-Presidents. The Statutes defining the functions of the Institute were settled at this meeting, and the organisation of the Institute was completed.

M. Louis Dop, delegate for France, was elected Vice-President of the Permanent Committee, which will be divided into three Permanent Sub-Committees to deal respectively with (1) Administration, (2) Statistics and Technical Information, and (3) Co-operation and Labour.

At the conclusion of the meetings of the Permanent Committee, Sir Thomas Elliott intimated that it had been decided that he should retire from the Committee, and that for the present and pending a definitive decision as to the manner in which this country should be represented on the Committee, his place would be taken by Mr. Percy C. Wyndham, Councillor of the British Embassy at Rome.

* *Further Papers and Correspondence relative to the International Agricultural Institute* [Cd. 4727] Price 9½d.

The following extracts from Sir Thomas Elliott's report may be quoted as indicating generally the position now occupied by the Institute, and the work which it proposes to perform:—"The magnificent generosity of his Majesty the King of Italy, in the endowment of the Institute, coupled with the almost complete support which has been accorded to the project by the various Powers concerned, have placed the Institute in a position of exceptional stability, and the only question now is as to the manner in which its resources can best be utilised in the interests of agriculturists all the world over, within the limits of the field of action defined by the Convention.

"It may be said generally that the object of the Institute is to do internationally what the Intelligence and Statistical Branches of the various State Departments of Agriculture endeavour, with greater or less success, to do in their respective countries. The work of the Institute will mainly consist in the collection, arrangement, co-ordination, and publication—with the utmost despatch possible—of the material which those departments can supply. This material differs very considerably in value, in character, and in extent, and if the work of the Institute is to be carried out in its entirety, and with accuracy and thoroughness, it must enlist the active support and co-operation of the various Governments with regard to the extension, completion, and in some cases the modification of their existing machinery. The task of the Institute will in this respect be an exceedingly difficult one, but it may be hoped that through the exercise of the influence of the various delegates on the Permanent Committee, obstacles may gradually be overcome and the necessary information obtained in gradually increasing value and volume. Happily for the immediate success of the Institute, well-organised Agricultural Departments exist in a large proportion of the countries whose agricultural position is of importance, and the area from which accurate information as to agricultural matters can from time to time be obtained will even at the outset be considerable.

"In this connection, I may mention that the Government of Roumania, being persuaded of the importance of the objects of the Institute, has organised a special Statistical

Department for the purpose of supplying to the Institute all the information it requires, and that the Belgian, Danish, and Hungarian Governments have established departments for the express purpose of furthering its interests. These departments will place themselves in communication with all the various public and private organisations concerned, with a view to obtain information likely to be of service to the Institute.

"I had opportunities of explaining to the Committee that in the opinion of the Board it was essential that every possible effort should be made to issue information of such a character, and at such times, as to be of value not only to the publicist, the statistician, and the historian, but also, and mainly, to those by whom agricultural operations are actually being carried on and to those whose industry depends upon the product of those operations. In this connection I may say that during the three years which have elapsed since the Convention was signed I have been greatly impressed by the interest displayed in the establishment of the Institute by the International Federation of Master Cotton Spinners' and Manufacturers' Association, of which Mr. C. W. Macara is the distinguished and trusted President, and by others, for whom at first sight the work of the Institute would appear to be a matter of but little concern. It has been pointed out that the agricultural product of one country is the raw material of industry elsewhere, and that consequently the prompt collection of complete information as to agricultural prospects and production is of great value not only to agriculturists but to many other important classes of the community. It is essential, however, that such information should be published in such a way and with sufficient rapidity as to enable business men—whether producers or consumers—to make full practical use of it.

"The bibliographical work to be done by the Institute should also be of great service to those who are engaged in scientific and technical investigations bearing upon agriculture. A periodical bulletin giving information as to the work of this character which is carried on in various countries of the world would often economise time and labour and enable more satisfactory results to be obtained.

"It is easy to foresee that the demands made upon the Institute for information and assistance will steadily increase, but its ability to respond to those demands will largely depend upon the extent to which it can command the services of practical and experienced men possessing both energy and ability as members of the Permanent Committee and as members of the staff. As regards the Permanent Committee which will practically control and direct the operations of the Institute, it is to be noted that several of the adhering States, including the United States, France, Germany, Austria, Hungary, Belgium, Norway, and Spain, have already appointed representatives who will be permanently resident in Rome, whilst others, principally the smaller States, will be represented either by the chiefs or other members of their respective Diplomatic Missions. It is certain that in the conduct of the affairs of the Institute the influence of men possessing special technical qualifications taking part continuously in the direction of the work of the Institute will be very considerable. It was decided that meetings of the Permanent Committee should be held at least once a month, and that for the control of the work of each of the three sections into which it is proposed that the staff of the Institute should be divided, a separate sub-committee should be constituted. If, therefore, the United Kingdom is to take any effective part in the work, some definitive arrangement must be made for our representation on the Committee by a competent expert on the questions to be dealt with by the Institute, willing and able to take up his residence in Rome so as to enable him to attend and take part in the meetings of the Permanent Committee and of the various sub-committees appointed in connection with the various branches of the work. The arrangements to be made for this purpose will require to be very carefully considered."

Among the appendices to the report are the Statutes of the Institute, which comprise the Convention of the 7th June, 1905, and the Regulations of the Institute; the latter define the procedure of the General Assembly, and deal with the administration of the Institute, the constitution of the Permanent Committee, the appointment of Committees and of the Staff.

"COUCH" OR "TWITCH."

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The terms "couch," "twitch," "scutch," and "whickens" are often applied by farmers in a general sense to several perennial grass-like weeds which creep on or below the surface of the soil.

The three species of grass usually known by the name "couch" are:—

(1) True "Couch" or "Twitch" (*Agropyrum repens*, Beauv.; *Triticum repens*, L.).

(2) Black "Twitch" or common Bent grass (*Agrostis vulgaris*, With.).

(3) Onion "Couch" (*Arrhenatherum avenaceum*, Beauv.; var. *bulbosum*, Lindl.).

These are among the most troublesome of all weeds of arable land, and when once established a great deal of expense must be incurred before the land is again clean enough for the growth of paying crops.

True "Couch" or "Twitch."—This is one of the most commonly distributed of European grasses, and grows on a great variety of soils. It is rarely present in pastures and meadows, but is found in almost all hedgerows and upon banks separating or bordering arable fields, and rapidly spreads from these situations over the cultivated land unless steps are taken to check it. The plant has whitish fleshy rhizomes, or underground stems, at the nodes or joints of which buds are produced, and also adventitious roots (Fig. 1). From the buds arise the upright growing stems, which come above ground and bear the ordinary green leaves, and ultimately the ears or inflorescences of the grass. The leaves are generally somewhat hairy on the upper surface, and at the point where the sheath and blade meet there are two hook-like ears or auricles which practically clasp round the stem. The ears or inflorescences (Fig. 2) are placed at the end of the stems, which are 1 to 4 ft. long, and the ears are built on the same plan as those of wheat, the spikelets being arranged in two rows alternately on opposite sides of the main axis or straw. Each spikelet consists of three to five flowers, and is placed so that its flat

or broadest face is next the axis, whereas in the ears of perennial rye-grass, which those of couch resemble superficially, the spikelets are arranged with the narrow, rounded face towards the axis of the ear. In some forms of the plant the glumes have short beards or awns.

The pest is propagated in two ways, namely, by seeds and by the underground rhizomes. Ordinarily the plants have not much opportunity to flower among farm crops, but flowering specimens are commonly seen in July and August in the hedgerows. The seeds ripen a little later and are blown on to the land, where they germinate and produce a new crop of weeds. Sometimes the seeds are introduced in unclean samples of grass and seed-oats. Although more couch plants arise from seeds than is generally supposed, the chief mode of propagation is by means of the creeping underground stems. These spread through the soil and soon form a dense mat of couch, which it is difficult to remove. In addition to natural extension from one point of the soil to another, the plant is inadvertently spread by the farmer during the cultivation of the land. The rhizomes get broken or cut up into short lengths by ploughs, hoes, and cultivators, and are moved about in the soil by these implements. Each small piece on which there is a single joint or node has its bud and set of adventitious roots, and is virtually a complete plant capable of extensive growth. It will be readily understood that a single couch plant may become broken up into a large number of such growing pieces and soon cover a wide area of ground.

Black "Twitch" or Common Bent.—This has a creeping habit, but its stems lie on the surface of the soil, and do not creep below like those of true couch. In some districts this is far the more prevalent kind of twitch, true couch being comparatively rare. The leaves are short and flat, and dull green; in some forms smooth, in others rather rough. The inflorescence is a panicle with fine slender spreading branches and purplish-green one-flowered spikelets of very small size (Fig. 3). There are no auricles at the base of the leaf-blade, but there is a membranous structure—the ligule—where the blade and sheath join. In true couch the ligule is absent or extremely short. These differences serve to distinguish black twitch from true couch when the plants are not in flower.

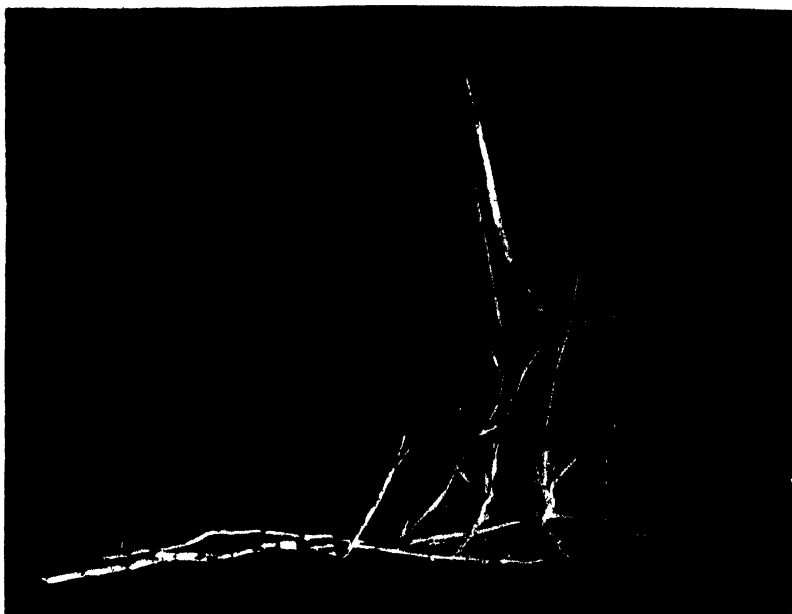


FIG. 1.—RHIZOME OF *Agropyrum repens*.

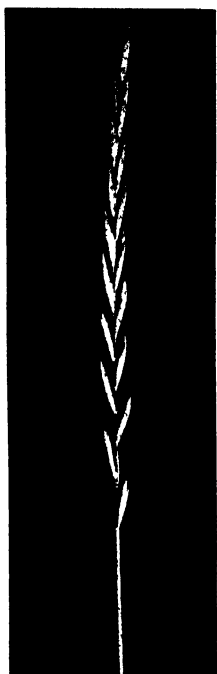


FIG. 2.—INFLORESCENCE OF *Agropyrum repens* (LEFT).



FIG. 3.—INFLORESCENCE OF *Agrostis vulgaris* (RIGHT).

Black twitch, of which there are several slightly different varieties, is as troublesome as couch, and is propagated in the same way, namely, by seeds and by its creeping stems.

Onion "Couch."—This is a peculiar variety of tall oat-grass met with locally, perhaps more particularly on the lighter class of soils. Where it has once got possession of the land it is practically impossible to get rid of it entirely. The characteristic features of this pest are the swollen internodes found at the base of the stems just below the surface of the soil. Each "onion" is solid, smooth, and round, about the size of a large pea, and is capable of withstanding



FIG 4 —ONION COUCH

drought for a long time. Several are joined together, and resemble a short string of beads (Fig. 4). They are easily detached from each other by harrows and other implements, and as each little knob possesses a bud the pest readily spreads over the land. The inflorescence of the plant is a large panicle, the branches of which are somewhat closely pressed to the main stem both before and after flowering. The spikelets and "seeds" are as large as those of a small oat, and resemble them in form; the flowering glume has a bent twisted beard or awn attached to it.

Remedies.—1. As all these pests are spread by means of their seeds, which are easily blown about, every effort should

be made to prevent flowering, and great care should be taken to procure grass-seeds and seed-corn free from those belonging to these weeds.

2. Hedgerows must be kept clear of these pests, for from plants growing there seeds are disseminated. Moreover, if the hedgerows contain couch of any kind, it will grow out into the headlands, and the first harrowing spreads pieces of rhizomes or the small "bulbs" of onion couch further into the field, and year by year the weeds extend.

3. Where the couch has become established, repeated ploughing, grubbing, and harrowing during the summer are the only means of dealing with it. The land should be ploughed at first with a shallow furrow, and as much as possible of the weed collected by harrowing when the soil is in just the right state of dryness to leave the roots and creeping stems of the weeds easily. After gathering together, it should be burnt in heaps and the ashes spread over the land. The passage of a roller over the land greatly assists the harrows and cultivators to shake off the soil from the couch and allow of its collection in unbroken lengths.

Care should be taken not to grub or harrow in wet weather, especially on the heavier kinds of land, or much mischief will be done. When wet, the clods are cut or roughly broken by implements into irregular lumps rather than pulverised, and the creeping stems are severed into short lengths too small to be effectively gathered by any implement. A similar state of things also arises when the land is too dry. There is a time in the drying of ploughed land when the soil readily falls into a fine, crumbly powder, and leaves the roots and rhizomes of weeds clean, and it pays to examine the soil carefully from this point of view before attempting to drag out weeds from it.

4. After cleaning in the manner just indicated, the land should be sown with mangolds or other root crops, or with beans, and the horse-hoe with grubbing tines should be kept at work between the rows as long as possible. Rape, vetches, or other similar crops which will grow luxuriantly and smother any weeds may also be grown with advantage.

5. In some cases isolated patches of couch may be forked or dug out and carried off the land.

MILK CHICKENS.

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There are three periods in a chicken's life when, without any special feeding, its flesh is most abundant and palatable. The exact age at which these stages are reached varies considerably, in accordance with the breed and the method of feeding adopted. Certain breeds are better at one time than another, or are better at an earlier age than other breeds. These three stages are (1) when from five to nine weeks old; (2) from eleven to sixteen weeks old; and (3) when seven to nine months old. This does not mean that all chickens can be killed at five weeks, but that it can be done in the case of specimens of the more precocious breeds, although the same stage of development in another breed may not be reached until it is a month older, when probably it would be larger in size.

It is with birds in the first of these stages that we are now dealing. Of these, however, there are several kinds. The milk chickens of Britain, of which the number produced is very small, are larger than some of the *poulets de lait* of Belgium, though of late the tendency in that country has been to produce bigger birds, more like the *petits poussins* of France. Recently the main source of supply for the English markets has been Hamburg, the birds being drawn from a wide district around that city, where the rearing is carried out extensively by small holders and others.* These smaller Hamburg and Belgian birds weigh 6 to 8 oz., whereas the larger Belgian, English, and French run from 8 to 12 oz. Across the Atlantic, what are called squab-broilers are still larger, weighing 12 to 16 oz. each. These differences in weight are to some extent due to the class of fowl used, but also to the way in which the birds are fed. When the entire lot of chicks hatched are fattened as milk chickens, they may be killed earlier than where cockerels alone are selected, for in the latter case time must be given for the sex-characters to appear, more especially the comb.

* Some information as to the production of milk chickens in Germany was given in this *Journal* in April, 1909, p. 24.

The demand for these small birds is not very large, though it is greater than the supply, and is chiefly restricted to the wealthy classes. The limit of consumption has, however, not been reached, though it cannot be expected that the trade will ever attain large dimensions, for, regarded merely as an article of food, these milk chickens are very costly. The same, however, may be said of Bordeaux pigeons, larks, &c., which maintain their position on all markets. Of late the price of milk chickens has fallen somewhat owing to the cheaper supplies from Hamburg. At one time wholesale rates were from 1s. 6d. to 2s. 6d. each, but 1s. 2d. to 1s. 10d. is now the range, with a few exceptional specimens selling for 2s. Paris prices are higher than in London, probably owing to the fact that Hamburg *petits poussins* cost more to send there, and are not quite the size of French birds. Still, at the figures named, the margin of profit is considerable.

The production of milk chickens is not an industry to be undertaken by itself, partly because, being a season trade, it would occupy less than half the year, and also because the cost of production is much less where this branch is only part of the operations. Attempts have been made by means of large plants to turn out *poulets de lait* on a wholesale scale. One of these has been described by Madame Van Schelle in her paper read at the Second National Poultry Conference, held at Reading in 1907,* but the establishment described was not continued, as it does not appear to have been a financial success. Difficulties arise when operations are intensive, and the heavy establishment expenses involved mean a great increase in the cost. Hence, so far as experience is available, there is no encouragement for taking up the work on a large scale. My observations in France, Belgium, Germany, and America have shown that the breeding and rearing of milk chickens can be made profitable if it forms part only of the work of the holding, but that if it is carried on by itself the results are likely to be very doubtful. At Haeltert, the place described by Madame Van Schelle, the chicks were reared artificially on shelf brooders, heated by pipes, a system which has yet to prove its practicability. Birds, however, were grown in two months to a weight of 2½ lb.

* Official Report of the Second National Poultry Conference, 1907, pp. 200-208

Suitable Breeds.—A very important point in the production of milk chickens is that of the breed of fowl used for this purpose, because to a large degree upon that depends the rapidity of growth and the time when the birds come into fleshy condition. For this reason the races which are at a later period of life the finest in meat qualities are not the best for milk chickens, in that they are slower in growth than the light-bodied, non-sitting, egg-laying breeds. This is especially the case with the heavy general purpose fowls. It is, however, almost entirely a question of size of body required in these birds. In France, as we have already noted, the weights are from 8 to 12 oz., for which Houdans and Faverolles are largely used. The lighter races are not much seen in that country. At one time the small Campine and Braekel were extensively used in Belgium as milk chickens, reaching the killing point at five to six weeks, but to a large extent they were the cockerels killed off as soon as distinguishable. More recently the heavier Malines fowls have been bred specially for that purpose, and as they are somewhat slower in growth, and attain a larger size, the Belgian *poulets de lait* are pretty much on all fours with the French, or even larger. The German chickens appear to be of a light-bodied type, that is, of the small races of fowls which are general throughout Western Germany and the Netherlands, though I am informed that Orpingtons and Wyandottes have been introduced into Hanover for this class of poultry production.

In America what are known as squab-broilers are largely the product of large egg farms where White Leghorns, or other breeds of a similar type, are kept. Generally speaking, the birds which are best as egg layers are poor in flesh qualities, excepting at one period, that is, when five to eight weeks old, just when the combs of the cockerels have sprung. As, however, Leghorns have yellow flesh and legs, they would not be so acceptable upon European as they are on American markets. On these huge egg farms, of which that at Lakewood, New Jersey, may be cited as an example, thousands of laying hens are kept, and as the birds are retained for not more than two seasons, the number of chicks hatched annually to maintain the stock is very large. At

Lakewood 7,000 hens form the total flock, and, therefore, 3,500 pullets are produced each year to replace the two-year-old hens thrown out. Hence 8,000 to 9,000 chickens must be hatched for that purpose alone, of which half will probably be cockerels. The profitable sale of these is all-important, and as the price realised for squab-broilers has been from 3s. to 6s. per couple, instead of cockerels costing more than their sale value they have left a handsome profit. Equal results could not be obtained with operations on a small scale, for which reason it is evident that those who can make the most money from the rearing of milk chickens are, apart from general farmers, such as can use what may fairly be termed surplus stock for this purpose.

Rearing.—For the first few weeks the chickens are fed and reared in the usual way, either by natural or artificial means. With the lighter breeds, such as Leghorns, Minorcas, Campines, &c., the sex may be distinguished at from four to five weeks old, when the cockerels should at once be separated from the pullets, and fed specially for a fortnight prior to killing. During this period they should be in a small, well-lighted house, and are better if not allowed out in the open, except for a short time every day.

Feeding.—The food should consist of oatmeal or ground oats, alternated with cooked rice, both of which should be prepared with soured skim milk, and a little pure fat, say half a pound per 100 birds per diem, should be mixed with it. In addition a very little small grain, wheat for preference, may be scattered among cut chaff on the floor once a day to induce exercise. Grit and green stuff should be supplied in abundance. It need hardly be said that neither artificial heat nor the natural care of the hen is required during this final period, as the springing of the comb is a sign that the maternal care is no longer needed. This feeding brings the birds into plump, fleshy condition. If feeding is prolonged the first moult takes place, during which the flesh will be reduced, and the lighter breeds will not come into as good condition again. With the heavier races the sex cannot be distinguished so early, and that is why they are killed later, when they are larger in body.

In America *squab-broilers are fed during the last ten to

fourteen days on a mixture of one part Indian meal and two parts bran, seasoned with a little salt and pepper, made into a wet mash, to which is added about ten per cent. of cotton seed meal and some cheap treacle or syrup. In this way a deep yellow skin is secured, but, as already stated, that is not desirable on our markets. It would appear that milk is not used.

The system of feeding adopted at Haeltert, described by Madame Van Schelle, was much more complete. In this case the birds were reared from birth as *poulets de lait* for early killing. For thirty-six hours after hatching no food was given. Then for a similar period white bread-crumbs were placed before the chicks in boxes, so that they could learn to eat, and at each time of feeding no more was given than would be consumed readily. When three days old a little yolk, not white, of hard-boiled egg was mixed with the bread-crumbs, but this was apparently only given for one day. From the age of four days a paste was given, composed of 10 pints of barley meal, $3\frac{1}{2}$ pints of buckwheat meal, one-sixth pint of powdered fish, and one-third pint of white cheese, with one or two yolks of hard-boiled eggs if available. This paste was prepared with boiling water and served lukewarm, and given six or seven times per diem, commencing at 5 o'clock and ending with a last feed at 7 p.m., even if lamp-light had to be used. The powdered fish was made of perfectly fresh heads and livers of skate and heads of cod, first salted, then baked, and finally powdered. It was claimed that the fish, being rich in phosphates, gave strength to the rapidly growing chicks and prevented leg weakness. Probably meat would have the same effect. Not until the fifth day was any water given. As the birds grew the barley meal was gradually reduced in quantity until at the end of six weeks it was entirely replaced by buckwheat meal for the last fortnight, and in the final week no fish meal was used. During these two weeks the mixture was moistened by a liquid consisting of three parts of milk to two parts of water. Such a system could be adopted by all who feed off these little birds, but for reasons already given it will be evident that the most profitable method would be for farmers and others to rear and feed during the early period in the

ordinary manner, giving the special food for the last fortnight.

In France it is customary to feed with cooked and mashed potatoes mixed with meal, and to give the birds beetroot; these two vegetable foods would tend to soften and increase the flesh, without affecting the white colour, which is regarded as a *sine qua non* on our markets.

Cost.—The industry seems to be one which is specially adapted to small holdings, and the individual care and attention which a small holder and his family would be able to bestow on the rearing and fattening of a small number of chickens should reduce the risk of loss from death. The profit from the sale of, say, 100 chickens, spread over a number of weeks, would be sufficient inducement to a small man, although it would not pay the ordinary farmer engaged on operations on a larger scale.

The question of cost, however, is all-important, and will vary considerably in accordance with the capital employed and the labour involved. Where the business is specialised, the capital and labour would be likely to absorb much of the profits. Another difficulty is that of securing a sufficient quantity of eggs for hatching at the exact time when they are required. If incubators and brooders are employed for hatching and rearing, the cost is less than the cost of feeding hens, but the capital expenditure is much greater. Our experiments on the College Poultry Farm, Theale,* have shown that where 100-egg incubators are employed, the cost of working an incubator for four weeks is 0·21*d.* per chicken hatched, and of working a brooder with 30 birds for four weeks is 0·17*d.* per chicken reared, or 0·38*d.* combined. To that must be added the value of the egg. It was found that 148 fertile eggs were required to produce 100 chickens, and as milk chickens are hatched early, when eggs are more valuable for eating purposes, 1½*d.* each must be allowed for the value of the eggs, so that the cost of each chicken at the time of hatching will be 2·6*d.*, that is, if the eggs are produced where hatched. If purchased, whatever is paid above 1½*d.* per egg must be added. This enables us to estimate the cost, apart from interest on capital, labour, and packages.

* *Journal of the Board of Agriculture*, August, 1905

A reference to the report of the experiments above mentioned shows that the average cost of food and the weights reached by 30 Faverolles during the first nine weeks were as follows :—

	Average cost of food per week.	Total food cost.	Average weights.
	<i>d.</i>	<i>d.</i>	Oz.
First week	0'08	0'08	1'23
Second „	0'23	0'31	1 7
Third „	0'34	0'65	2'93
Fourth „	0'34	0'99	4'4
Fifth „	0'47	1'46	7'47
Sixth „	0'62	2'08	8'9
Seventh „	0'67	2'75	11'1
Eighth „	0'64	3'39	13'13
Ninth „	0'52	3'91	17'31

Taking this experiment as a basis for our calculations, the total cost of production and food, inclusive of eggs and oil for operation of incubator and brooder lamps, and also grit, but not interest on capital and labour, would be as follows :—

Five weeks old chicken ...	Egg and oil ...	2'6 <i>d.</i>	4'09 <i>d.</i>
	Food	1'46 <i>d.</i>	
	Grit	0'03 <i>d.</i>	
Six weeks old chicken	Egg and oil ...	2'6 <i>d.</i>	4'72 <i>d.</i>
	Food	2'08 <i>d.</i>	
	Grit	0'04 <i>d.</i>	
Seven weeks old chicken ..	Egg and oil ...	2'6 <i>d.</i>	5'4 <i>d.</i>
	Food	2'75 <i>d.</i>	
	Grit	0'05 <i>d.</i>	
Eight weeks old chicken ...	Egg and oil ...	2'6 <i>d.</i>	6'04 <i>d.</i>
	Food	3'39 <i>d.</i>	
	Grit	0'05 <i>d.</i>	
Nine weeks old chicken ...	Egg and oil ...		6'56 <i>d.</i>
	Food		
	Grit		

It is evident, therefore, that, where the birds can be sold at from 1*s.* 2*d.* to 1*s.* 10*d.* each, there is a large margin of profit for those who have no special labour bill to meet, and whose establishment expenses are borne by other branches, whether operations are on a large or small scale. It is doubtful if a profit could be obtained where a place was run for this object alone, for then the question of successful rearing would have to be considered, and a heavy mortality would destroy the profit altogether.

Marketing.—Milk chickens are killed and plucked in the usual way. It is only necessary to turn the wings and throw up the breast meat. They should be neatly packed in grease-proof paper-lined boxes holding two or four dozen, the cost of which should not exceed $1\frac{1}{2}d.$ per dozen birds.

ROOT-PRUNING FRUIT TREES.

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It not infrequently happens that certain varieties of fruit trees are found to be very slow in coming into bearing. This is particularly noticeable with such kinds of apples as Peasgood's Nonsuch, Blenheim Orange, Bramley's Seedling, and Annie Elizabeth, when grown on the free stock (seedling apple), and the same remark applies to most pears on the free stock, also to stone fruits. When growing for market this is a serious matter, as all the expenses of cultivation have to be met, if the future well-being of the trees is a consideration, whether any returns are forthcoming or not, and as there is a demand for these varieties, it is useless to suggest that growers should avoid planting them.

In a large number of districts the production of fruit can be hastened by planting trees on dwarfing stocks, but in some cases this procedure cannot be considered a commercial success; on really rich soils these stocks are to be recommended, but even then vigorous growing varieties do not always come quickly into bearing when left to themselves.

Root-formation.—When the roots are coarse and strike deeply into the soil and subsoil, the shoots produced are also coarse and gross, and fail to mature sufficiently to develop blossom buds, with a consequent failure to produce fruit. Fruit trees, to bear freely, must have a good fibrous root system, and these roots must be near the surface.

Trees growing in this way will eventually bear fruit, and that heavily, provided that they are sufficiently far apart to allow of free extension, and that the growths made by them are not too severely cut back. Thinning the branches to about 18 inches apart, and removing the unripened points, is all the pruning that should be given to trees growing

with excessive vigour. This will hasten the production of fruit considerably, but shoots grown under such conditions are very susceptible to attacks of canker in Apples and Pears and "gum" in stone fruits; they are also likely to be pulled out of place, perhaps broken, when laden with fruit, being too thin and weak to carry the crop properly.

Root-pruning.—Growers should aim at the production of sturdy, well-matured shoots only, if quick returns are required, and when trees of even the most vigorous varieties make more than twenty to twenty-four inches of growth in a season, it is a sure indication that they are developing some deep-growing coarse roots. Fruit trees, therefore, which are producing wood at the expense of fruit, should be root-pruned some time between the end of October and the end of November. Trees root-pruned at that time quickly become re-established, and frequently make several inches of new root growth before the ground becomes too cold. If left much later, new growth does not commence till spring, while if operations are begun much earlier the shoots shrivel. Lifting and re-planting should be the method adopted with trees three or four years old; if longer established, root-pruning will be most advisable.

In the case of pears and plums grown as bushes, pyramids, or trained trees, it almost always pays to lift about the second or third year after planting. This usually causes them to develop fruit buds freely the following summer, without giving an undue check. At this time the roots will be moderately plentiful and fibrous, and will therefore quickly make a fresh start in the soil.

Method of Lifting and Pruning.—When lifting, the operator should commence by opening a trench beyond the spread of the branches, working his way inward very carefully, so as to damage the roots as little as possible. When clear of the soil the tree should be held upside down, and roots which were growing directly downwards, together with all other coarse ones, should be cut away with a clean cut, but all the finer and more fibrous ones retained. It should then be re-planted with all its remaining roots carefully spread near the surface, radiating in all directions. The roots should then be covered with a few inches of fine soil,

made firm, and mulched with four to six inches of strawy stable manure as a protection against frost.

Root-pruning without Lifting.—Trees established longer than three or four years, and producing too much wood, have roots too coarse to admit of being lifted without causing an unduly severe check, and one from which it would take them two or three years to recover. In the case of these larger trees, no more than one-half of the root system should be interfered with in any one season. It is quite essential to leave sufficient roots properly established to carry on nutrition.

The best procedure to follow in the case of trees too long established to admit of lifting, is to mark out a semicircle, well beyond the spread of the branches, and on that side of it opposite to the prevailing wind of the district, usually on the N.E. or E. side. A trench about 2 feet deep should then be opened at the mark, and the whole of the soil within the area made by it removed. As the work is going on all the fibrous roots must be carefully preserved, even those having a downward tendency; they should be tied together in bundles and suspended from the branches above, to keep them from accidental injury through the careless use of tools. All coarse ones must be removed entirely, the operator working gradually and carefully inward until the base of the tree is freed, so that it may be tilted back for examination and the tap roots that will most probably be found there cut away. The exposed roots must be examined and all damaged ends made smooth with a keen knife, starting to cut from the upper surface and sloping towards the lower.

The soil should then be replaced and made compact to within a few inches of the surface, the tree held in its place with its roots well spread and covered with some fine material, all being made firm, and mulched as in the case of re-planting. Any trees of five feet or over in height should be so stayed that they may not be blown about and loosened, or re-establishment will not take place readily.

Except in bad cases, this half-root pruning will have the desired effect, but sometimes it will be necessary to treat the remaining half the following year. By that time roots that have already been pruned will have developed a good quan-

tity of fibre and become well established. Trees that have been root-pruned will make quite sufficient wood growth for their well-being, and at the same time develop fruit spurs freely, to be followed, climatic conditions permitting, by a good crop of fruit.

The following note has been supplied to the Board by Dr. R. Stewart MacDougall :—

The *Cynpidæ*, or Gall Flies, are a family of minute Hymenopterous insects whose larvæ live in galls, or in some cases are parasitic in the bodies of other insects.

**Gall Flies on the
Oak.**

The true gall fly lays an egg or eggs in the live tissue of the plant. The meristem tissue of the plant is stimulated by the



FIG. 1 —Galls due to *Neuroterus lenticularis*.

presence of the larvæ and their puncturings and secretions, and the result is the swelling known as a gall. Here the

larva lives and feeds after the hatching of the egg. Guest flies or *inquilines* may lay their eggs in the gall itself, and their larvæ on hatching use the gall as a place of habitation without harm to the insect actually causing the gall.

An interesting feature in the life-history of these gall flies is the occurrence in many of them of an alternation of generations, a generation of virgin females alternating with a generation containing both males and females, the gall from which the one generation emerges being different from the gall to which that generation gives rise.

Neuroterus lenticularis.—In the case of this species of gall fly, the galls occur in large numbers on the under side of oak leaves (see Fig. 1), showing after midsummer and falling away in the autumn. Each gall holds a single larva. The winter is passed in the larval condition, and the adult flies—only females—issue in the next spring or early summer. These females do not puncture expanded oak leaves, but prick the buds and give rise to small round galls—the *Spathegaster baccarum* galls—3 to 5 mm. in diameter, green in colour, spotted with red. These galls are found on the leaves and on the axis of the male catkins (Fig. 2). The adult flies—males and females—issue from these galls about the middle of June. The females after pairing pass to the leaves of oak trees, which they puncture, the result being the galls of *Neuroterus lenticularis*.

Oak Apples.—The oak apple galls result from the puncture of a bud—usually a terminal bud—by a virgin female that has issued from a root gall. These females, which are wingless, prick a bud repeatedly, and as a number of eggs are laid in the same bud the gall which results (Fig. 3) is a many-chambered one. At first the gall is soft, but when “ripe” in June or the beginning of July, the central portion is woody. The male and female flies (*Teras terminalis*) issue in July. The females are without functional wings. The fertilised females pass to the roots of the oak (some, however, prick buds and leaf-stalks, causing galls on these), where eggs are laid, with the result that a gall appears which breaks its way through the cortex. The ripe galls on the root are hard and of a brown colour. The adult flies from these root galls (*Biorhiza aptera*) pass to the buds as stated above.

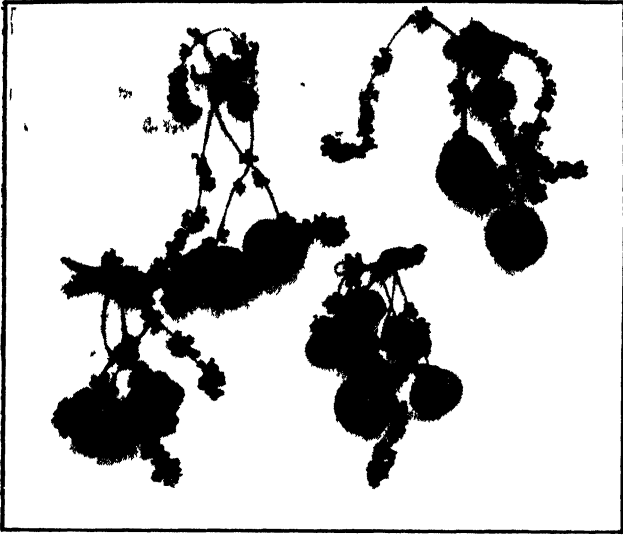


FIG. 2 —GALLS CAUSED BY *Spathystele bacarum*

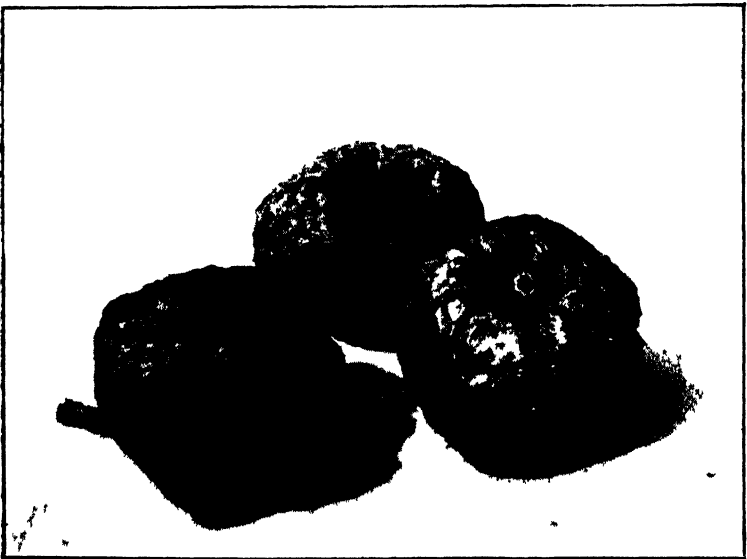


FIG. 3 —OAK ALPIT GALLS CAUSED BY *Leras terminalis*

The Bulb Mite (*Rhizoglyphus echinopus*).—During the winter of 1908-9 the Board received several letters from correspondents who were much troubled with

**Notes on Insect,
Fungus, and other
Pests.**

the bulb mite (Leaflet No. 136). Unfortunately, no definite results could be arrived at in most cases, but the following observations of one large grower in Ireland are worth recording. A number of bulbs, taken out of pots, with the soil adhering, from districts in England where eelworm and mite abound, were treated with Vaporite and Apterite. The correspondent writes: "I find that either of these pest-destroyers, if very lightly powdered over a scale of a bulb affected with these most pernicious pests, will kill all in a short time. I examined one scale the other day, and found under the microscope that the scale had on it 51 adult mites, and many small ones, and 7 eelworms. I then powdered it as lightly as possible, not to interfere with my view of the pests, and found that the eelworms died in a few moments, the mites within one hour. I had some of the mites, before they were quite dead, placed on a piece of paper under the microscope, to see if they would recover when removed from the effect of the Apterite, but they all died. I tried some of the infested bulbs in water, about a soup-plate full, with half a teaspoonful of Apterite, and the mites were dead or dying after 24 hours' immersion. I placed a growing narcissus bulb (perfectly healthy) in a similar mixture of water and Apterite for the same length of time, and then planted it in the open ground from which I had taken it. It has been absolutely uninjured, from which I infer, as from some other similar experiments, that the Apterite and Vaporite are quite harmless to bulbs in the growing stage." This observation is interesting, and might with advantage be confirmed experimentally by English growers.

The Narcissus Fly.—The value of annihilative measures in the case of the destructive maggots of the Narcissus Fly (*Merodon equestris*) is proved by the experience of the grower already quoted. Four or five years ago *Merodon* proved a great pest in narcissus bulbs. The practice was

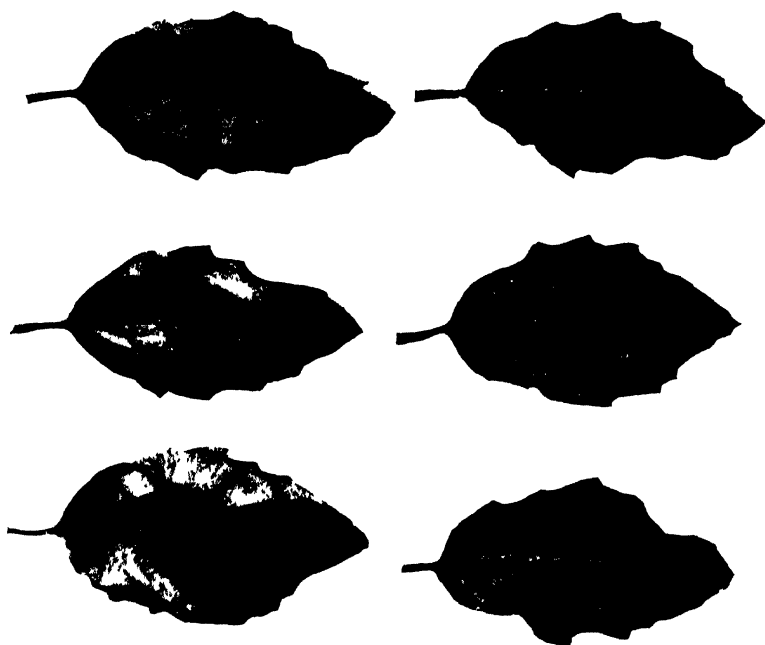
adopted of destroying all sickly infested bulbs, with the result that this pest is now rarely found.

Lithocolletis messaniella.—In May a correspondent near Guildford forwarded a bough of Evergreen Oak the leaves of which were infested by the larvæ of this moth. It was stated that apparently every evergreen oak in the immediate neighbourhood was affected, and that some of the younger trees had injuries on every leaf. The accompanying illustration shows the nature of the damage done. At the time when the leaves were examined, the insect was in many cases still present in its pupal form, but some of the moths had already issued, and were, no doubt, preparing to lay their eggs for a new brood. These small Tineid moths, which are liable to be mistaken for tiny flies, lay their eggs on the underside of the leaves, into which the newly-hatched larvæ bore. The inside of the leaf is mined until, sufficient food having been taken, the caterpillar pupates. There is usually a brood in May, and another in late autumn. Preventive measures are not easy, as the larvæ cannot be reached inside the leaf. The best course is to collect and burn all infested leaves, and to spray the uninfested trees with paraffin emulsion, or a solution of arsenate of lead, the value of which in connection with allied moths is known. As not only the evergreen oak, but the ordinary oak, the hornbeam, and the chestnut are known to suffer from this pest, the moth is of some economic interest. The abnormal weather prevalent during May and June appears to have had great influence on this infestation, for so long as the bright, sunny weather of May prevailed, the moths were to be seen in scores, but the heavy rains and dull weather that succeeded cleared most of them away.

Red Spider.—A correspondent from the vicinity of Mortimer, Berkshire, having suggested to the Board that Red Spider (Leaflet No. 41) does not attack all varieties of gooseberries to the same extent, inquiry was made through the Board's Inspectors as to the experience of growers in the Evesham and Wisbech areas. The results are not very definite, as no opinion was received from the first-named district, but from Wisbech it was reported that Crown Bobs, which are extensively grown there, suffer much more than the hardier varieties. Whinham are attacked, but to a less



EVERGREEN OAK LEAVES DAMAGED BY THE TINEID MOTH *Lithodolus m. satulilla*. UPPER THREE (RIGHT) SHOWING DISCOLORATION ON UPPER SURFACE; LOWER THREE (RIGHT) SHOWING MILD AND BROKEN TISSUE ON UNDER SURFACE.



serious extent, and Careless is believed generally, if not always, to escape.

Fungi.—Some cases in which gooseberry bushes have been attacked by the disease known as Gooseberry Clusters (*Puccinia pringsheimiana*, Kleb.) have been reported to the Board, and there is some reason for thinking that this disease has been rather more prevalent this year than usual. The most noticeable cases were reported from Stepside (Pembrokeshire), Whitchurch and Stockbridge (Hants), and Raveningham, near Norwich. (See Leaflet No. 209.)

Two cases have been reported in which Coral Spot (*Nectria cinnabarina*) attacked and destroyed, as it appears, living trees. In the first case, apricot stems at Feltham, Middlesex, and in the second gooseberry bushes at South Winton, near Winchester, were affected. One half of a small gooseberry bush withered last year, and the owner cut away the dead part; the remainder grew this year and fruited well, but died in June. A large bush next to it, which is thickly laden with fruit and foliage on most of its branches, has, during the present year, lost two or three branches from Coral Spot. (See Leaflet No. 115.)

Potatoes have been sent to the Board from Montrose affected with *Rhizoctonia violacea*, and from Pilsworth Whitefield, near Manchester, attacked by Dry Scab, *Spondylocadium atrovirens*. (See *Journal*, April, 1909, p. 31, and May, 1909, p. 125.)

A fruit-grower near Ballasella, Isle of Man, forwarded a fly for identification in May, and it proved to be *Dilophus febrilis*. The larvæ appear to have done some damage, but no exact information was given. (See *Journal*, July, 1907, p. 219.)

The Asparagus Beetle (*Crioceris asparagi*) was reported to have appeared in several gardens near Yeovil, but not in large numbers (Leaflet No. 47). *Otiiorhynchus picipes* was forwarded from Sheffield and Leicester, and the Raspberry Beetle (*Byturus tomentosus*) from Hevingham and Blofield, both near Norwich. The Pear Midge was reported from Layer de la Haye near Colchester, Trewirgie near Redruth, and Eversden (Cambridge). In each case the writer stated that the pest had been present for some years (Leaflet No. 53).

The Board of Agriculture and Fisheries have been supplied with the following note by Mr. W. R. Dunlop, of the South Eastern Agricultural College, Wye:—

**The Utilisation of
Barley Straw in the
Manufacture of
Ensilage.**

It is a matter of common knowledge to feeders of stock that barley straw is of much less use on the farm than either oat or wheat straw. Barley straw neither makes such good fodder as oat straw, nor is it as valuable for litter as wheat straw. Some method, therefore, of increasing the feeding value of this material could not but be of advantage to farmers, especially to those who have barley straw left over each year, and who find it difficult to deal with this surplus economically.

From the results of experiments recently made on this subject, it is considered probable that the digestibility of barley straw could be considerably increased by fermentation with greenstuff under pressure. In other words, instead of making ensilage from greenstuff alone, barley straw might be added to the greenstuff and the mixture compressed and allowed to ferment.

Even on a small scale the effect upon the straw is most marked; its characteristic natural resistance is lost, and the various fatty acids and aromatic compounds produced during the fermentation tend to make it very palatable to stock. There is always a risk, however, in working with fermentation of this sort that it may go too far, and putrefaction set in. On a small scale and in an experiment this may easily happen, as it is very difficult to exclude all air. Even in practice the manufacture of ensilage is always accompanied by a certain amount of putrefaction, especially in the top layers where the air gets in. This area is exaggerated in a small experiment, and so tends to give an unfair result. On a large scale where a big stack is made, or where a proper silo is used, the mass of material provides its own pressure, and under these conditions very little air can enter.

The fermentation of the mixture is accompanied by a loss in weight, which is shown all through by an increase in the percentage of ash. Part of this loss comes from the non-resistant nitrogen-free extract, but a considerable part is shown by the figures to be due to the breaking down in some

way of the resistant nitrogen-free material. Some of the protein is broken down into amino-acids. The chief value of the fermentation probably lies in the removal of such bodies as lignin from the straw, thus making the cellulose more easily attacked during the digestive processes. There is probably no actual conversion of resistant into non-resistant cellulose.

The best proportion in which to mix the green and straw is three of green material to one of straw (by weight), and in most cases it should be unnecessary to add any water. The greenstuff may consist of tares or any other suitable green crop, but it is essential that the material should be perfectly fresh when used. It should therefore be employed directly after it is cut. In the experiments 1 cwt. lots were used, and it was found that the material was most suitable for feeding after six weeks; after that time, owing to the continual disturbance caused by the taking of samples, putrefaction gradually set in, and at the end of three months the material was worthless for feeding purposes. On a large scale the material would remain in good condition for a very much longer period.

Whether this means of using barley straw is applicable in practice can only be ascertained by actual trial. Comparative feeding experiments between the ensilage and roots would also give much information. The making of the material involves a considerable amount of labour. The straw and greenstuff must be chaffed, and also carted and elevated. On a farm where a small engine is kept the cost of labour would be much lessened, and in making large quantities an ensilage cutter and an elevator, such as are used in the United States, would probably prove a good investment; an ordinary chaff-cutter, however, can be employed quite successfully. Similarly a properly constructed silo would give the best results, but the material can be fermented in the stack quite satisfactorily.

It should be pointed out that the experiments on which these remarks are based were merely of a preliminary nature, and require verification and development; the investigation, from a chemical point of view, is undoubtedly in the right direction, but the matter is so essentially one of practice that it must be

left to the farmer to decide—not whether it is capable of development—but whether, in his opinion, it is worth it.

The growth in the export of cereals and of live stock products from Argentina in recent years has been very great, and that country may now be said to occupy a predominant position in the world's markets as regards several of the leading agricultural products. For

Agriculture in the Argentine Republic.

the past two or three years it has been the largest exporter of wheat, maize, and beef to the United Kingdom, while its exports of several other products formed a substantial proportion of the total receipts. The official statistics of the Ministry of the Argentine Republic for the year 1908 give some information as to the change in agricultural conditions in recent years, which shows how rapidly new areas have been brought under cultivation.

The three principal grain crops are wheat, linseed, and maize, and during the last thirteen years the area devoted to these crops has trebled.

	1895. Acres.	1908. Acres.
Wheat	5,062,700	14,975,900
Linseed	956,700	3,789,700
Maize	3,073,100	7,345,500

An important point in the growth of the area devoted to cereals has been the widening of the territory from which the supplies are drawn, with the consequent diminution of the risks of failure from drought, frost, hail, &c. Thus in 1895 the growth of wheat and linseed was largely concentrated in the Province of Santa Fé and part of Cordoba, these two provinces representing two-thirds of the total area, while 21 per cent. was found in Buenos Ayres, 12 per cent. in Entre Rios, and only 1 per cent. elsewhere.

The distribution in provinces in 1908 was as follows:—

	Wheat. Per cent.	Linseed. Per cent.	Maize. Per cent.
Buenos Ayres	40	28	49
Cordoba	25	11	9
Santa Fé	23	44	28
Entre Rios	5	15	4
Pampa	5	2	10
Other provinces and territories	}		

At the present time, therefore, the crops are much more

widely scattered than in 1895, and unfavourable climatic influences, even though disastrous in their particular localities, would be much less likely to affect the cereal harvest as a whole.

The average proportion of wheat exported during the past five years is stated to represent about 70 per cent. of the production, 9 per cent. being used for seed and 21 per cent. for food, but the proportion naturally varies with the harvest, as the two latter items are relatively constant. In 1907-8 the total production was estimated at 5,238,705 metric tons, of which 430,000 tons are assumed to be required for seed and 900,000 tons for consumption, leaving 3,908,705 tons available for export. The quantity actually returned as exported in the calendar year 1908 was 3,636,294 tons of wheat and 113,500 tons of flour.

The average yield of wheat in recent years has been about $11\frac{1}{2}$ bushels per acre, but this relatively low yield is counterbalanced by the fact that the cheapness and fertility of the land and the favourable climate enable the soil to be cultivated with a small capital, little expenditure being incurred for buildings, and no manuring being done. On the other hand, machinery is largely employed, particularly reapers, while no fewer than 6,186 steam thrashing machines are returned as working in 1907-8.

Oats seem hardly to have been grown at all in 1895, and in 1900-1 the area devoted to this crop was only about 30,000 acres. During the last three or four years, however, it has extended rapidly, and in 1908 the area was 1,564,000 acres. The exports, which were only 15,000 tons in 1905, rose to 440,000 tons in 1908, a large proportion of which came to the United Kingdom.

The production of maize in 1907-8 was 3,456,000 tons, and the export in the year 1908 was 1,711,800 tons. The latter figure was much below those of some earlier years, the exports in 1906, for example, reaching 2,693,709 tons. The report of the Ministry of Agriculture mentioned above states that the cultivation of this crop shows a tendency to increase, and although liable to injury from weather, locusts, &c., the average yield is sufficiently high to give a good profit, while the cost of production is lower than in other countries.

The production of linseed has increased from 232,000 tons in 1895-6 to 1,101,000 tons in 1907-8, and Argentina now produces more linseed than any other country. Except for the quantity required for seed, the whole of the crop is exported, and in consequence the influence of the country on the market is considerable. Of 2,067,000 qrs. imported into the United Kingdom in 1908, 1,205,000 qrs. came from Argentina.

The cultivation of lucerne, which, apart from natural grasses, is the principal fodder crop, is also reported to have extended rapidly. No annual returns are obtained, but it is estimated that more than 10,000,000 acres are under this crop, compared with about 1,760,000 acres in 1905.

The number of live stock in the country has also increased very considerably as regards cattle, horses, and pigs, though a decrease of 10 per cent. has taken place in the case of sheep. Some particulars as to their distribution were given in this *Journal* in February last (p. 850), where it was noted that there has been a marked transference of the sheep-breeding industry from the more thickly populated districts, where land has risen in value, to the interior and less cultivated regions. Cattle, which appeared to have increased in all parts of the Republic, numbered 29,117,000 head in 1908 as compared with 21,792,000 in 1895. The export of frozen or chilled beef last year was equal to 573,946 head of cattle, a higher figure than in any previous year, while in addition 247,500 were exported in other forms, and 60,916 on the hoof. The export of frozen sheep represented 3,297,667, compared with 2,802,000 in 1907, while 103,792 were sent from the country alive. Chili, Uruguay, and Brazil are the principal customers for live cattle, while in 1908 a large proportion of the sheep went to Belgium. The United Kingdom takes practically the whole of the frozen meat.

Mr. C. Russell, Secretary of the British Legation at Buenos Ayres, observes in a recent despatch that the annual live stock show at Buenos Ayres attracted an increased number of exhibits in 1908, especially in the classes of horses and pigs. The chief honours fell, as usual, to those farms where the best English blood has been introduced, regardless of expense. Argentine patriotism derived much

satisfaction by the English judge's award of the championship to a Shorthorn bull, the offspring of a locally bred sire. The champions of the show had hitherto been invariably sired by imported pedigree stock. This bull was sold by auction for £3,000.

The importation of breeding animals fell off very substantially in 1908, though Shorthorn cattle and Lincoln sheep continue to form the bulk of the imports. The figures for the past four years from all countries have been as follows :—

	1905	1906	1907.	1908
<i>Cattle</i> —Shorthorn	1,360	2,180	1,219	645
Hereford	56	93	46	27
Polled Angus	19	116	48	16
Red Polled	4	27	3	16
Jersey	13	23	16	12
Other breeds	10	5	11	24
Total	1,462	2,444	1,343	740
<i>Sheep</i> —Lincoln	4,546	6,555	3,551	1,765
Hampshire	260	412	114	60
Shropshire	243	299	244	59
Oxford	83	30	26	77
Romney Marsh	197	217	271	137
Other breeds	323	289	106	125
Total	5,652	7,802	4,312	2,223
<i>Horses</i> —Racehorses	195	302	219	197
Clydesdale	79	210	146	76
Hackney	49	100	40	62
Shire	34	69	57	55
Yorkshire	31	9	7	11
Other breeds	160	452	415	364
Total	548	1,142	884	765

Some English racing stock of the best quality went to Argentine studs during the year. Two consignments of this type sent for auction from North America brought indifferent prices, and the experiment is not likely to be repeated.

With a view to encourage dairying under the best conditions, the Oxfordshire Agricultural Society recently awarded three prizes to be competed for by

A "Milk Contest." tenant farmers residing within a radius of twelve miles of Oxford. In allotting the prizes, not only the quality of the milk, but also the condition of the cows and cowsheds, cleanliness of milking, &c.,

were taken into consideration, marks being given according to the following scale:—

Full Marks.	Points.
4	Condition of cows.
4	Cleanliness of cows.
4	Cleanliness of cowsheds.
5	Careful removal of manure.
3	Equipment of dairy, provision of hot water, pails, strainers, &c.
5	Care and cleanliness of utensils.
2	Health, &c., of attendants.
5	Cleanliness of milking.
3	Prompt and efficient cooling where required.
20	Average quantity of milk per cow from a commercial point of view, allowance being made for period of lactation.
10	Flavour of milk.
20	Composition of milk.
20	Keeping quality of milk.

The conditions required the sample of milk to be taken from the whole bulk of mixed milk from any herd of not less than ten milking cows, the herd not to contain more than one cow of a Channel Island breed to every ten of other breeds. The milk was required to stand covered in the cowshed until all the herd had been milked, and the milking was to be done between midday and 4 p.m. in the presence of the Inspecting Judge, by whom the sample was taken. The Agricultural Department, University College, Reading, undertook the analysis of the sample, and awarded marks accordingly, while the marks for condition of cowsheds, &c., were given by the Inspecting Judge.

The Railway Conference was constituted by the Board of Trade in February, 1908, with the object of reviewing some of the more important questions that have been raised from time to time between the railway companies on the one hand and the traders and general public on the other. The Board of Agriculture and Fisheries were represented on the Conference and on the three sub-committees appointed to consider and report on certain groups of questions.

A number of meetings have been held, and a report (Cd. 4677, price 1s. 5d.) has now been issued containing the

conclusions arrived at by the Conference, together with a number of memoranda prepared for the information of the members. Among the subjects dealt with are two which are of special interest to agriculturists:—(1) the machinery for settling disputes between companies and traders, and (2) owner's risk rates.

Machinery for settling Disputes between Railway Companies and Traders.—Throughout the discussions of the Conference it was urged by the representatives of the traders that some simpler procedure than that of the Railway and Canal Commission should be established, not only for the purpose of discussion, but, if possible, for settling complaints arising under the Railway and Canal Traffic Acts with regard to rates, charges, and other matters.

It was suggested that the proceedings before the Railway and Canal Commission were costly, and that the procedure was framed too much upon formal judicial lines. The representatives of the railways were not unwilling to agree to some modification, and they suggested that the object of the traders might be attained by a preliminary procedure before the Registrar to the Commissioners, who, if desired, might receive the assistance of assessors, and whose decisions should be final if so agreed; the whole procedure to be of a more informal character, following the practice of the Commercial Court, which has proved so successful in the High Court of Justice.

After communication with the Registrar, the Conference agreed to recommend this modified procedure in the hope that it may result in the establishment of a cheap and satisfactory tribunal for the settlement of many of the questions arising between railway companies and traders.

The detailed scheme of the proposed procedure for cases which the Railway and Canal Commissioners have power to determine on complaint being made by a trader under the Railway and Canal Traffic Acts is as follows:—

1. Notice of claim to be sent to the Railway and Canal Commission.
2. Unless otherwise agreed, the parties to attend before the Registrar for the purpose of settling procedure.
3. The parties may agree that the case shall be heard—
 - (a) by the Registrar,
 - (b) by the Registrar with assessors, or
 - (c) by the Commissioners.

Where the tribunal is not agreed upon by the parties, the Registrar to determine whether the dispute shall be referred to (a), (b), or (c).

4. The parties may also agree that in cases (a) and (b) the decision shall be final, and in that event the decision shall not be open to review on any ground for a period of three years.

In default of agreement :—

(1) Any decision come to before the Registrar sitting with or without assessors to be subject to appeal in the Court of the Railway and Canal Commission.

(2) The costs of the appeal to be paid by the party applying for it if the decision of the Registrar is confirmed.

5. In proceedings before the Registrar, whether with or without assessors, the parties may appear in person or by their solicitor or counsel.

Only one counsel or solicitor to be heard on behalf of each party to the dispute.

Commercial Court practice to be followed.

6. The Registrar to have power to refer the case, or any question arising therein, to the Commissioners at any stage of the proceedings.

7. When the Registrar sits with assessors, two assessors to sit unless otherwise ordered.

Such assessors to be appointed by the parties, one by the complainant and the other by the defendant. No barrister or solicitor to be nominated as an assessor.

8. In the case of complaint of an increase of rate, or an application for through rates, it shall no longer be a necessary preliminary to a complaint to make any application to the Board of Trade under Section 31 of the Railway and Canal Traffic Act, 1888, it being understood, however, that this procedure before the Board of Trade shall always be available if desired.

Owner's Risk Rates.—Owner's risk rates are rates made by special contract, under the provisions of Section 7 of the Railway and Canal Traffic Act, 1854. They are generally lower than the ordinary rates, and in consideration of the reduction in the rate, the contract, which must be signed by the trader, and is only enforceable at law if its conditions are held to be just and reasonable, relieves the railway companies from their ordinary liability as carriers, except in the case of the wilful misconduct of their servants. Sometimes the consideration for the contract is not a reduction in rate, but the acceptance unpacked of goods liable to breakage or damage.

The grievances put forward on the part of the traders were mainly twofold :—(1) that the companies ought not only to be liable for wilful misconduct, which was difficult of proof, but should also pay compensation in extreme cases in which, for example, loss or damage was occasioned by the grosser

forms of negligence on the part of the companies' servants; and (2) that owing to the lowness of the owner's risk rates as compared with the corresponding company's risk rates, they are the only rates commercially possible for the ordinary trader.

The answer of the railway companies is that the reduced rates at owner's risk are a concession to the trader, and are the subject of a purely voluntary contract between the parties, which is almost invariably based upon other considerations as well as that of risk, and that it is always open to a trader to have his goods carried subject to conditions applicable to railway carriers at a rate within the company's statutory maxima, and that these had been recently settled by the Acts of 1891 and 1892.

It appeared from the evidence that the companies do not strictly enforce their legal rights in all cases.

It was pointed out to the Conference that an extension of the liability of railway companies in the direction desired by the traders could be secured either (1) by enlarging the liability of the companies under their contract note so as to include, for example, cases of gross or serious negligence, or (2) by drawing up a list which might be inserted in the consignment note of specific instances in which compensation would be paid.

The Conference, after full discussion, resolved to recommend the second alternative as a solution of the difficulty, and finally adopted three clauses embodying a list of cases where, subject to the conditions of the note, the companies would accept liability. These, it is proposed, should be inserted in the existing consignment notes for general goods, perishable merchandise, other than milk, carried in passenger trains, and milk, respectively.

At the desire of the Conference, the railway representatives consulted the companies generally, and ascertained that, with the view of settling this controversy and avoiding legislation, they were willing to embody these additions in their present consignment notes subject to any drafting that might be found necessary by counsel.

The amendments recommended are as follows:—

1.—*Goods carried in Merchandise Trains.*—The following addition to be embodied in the present consignment note for goods to be carried at

owner's risk in merchandise trains, after the words "wilful misconduct of the Company's servants," viz. :—

But nothing in this agreement shall exempt the Company from any liability they would otherwise incur in the following cases of non-delivery, pilferage or mis-delivery except on proof that such non-delivery, pilferage or mis-delivery has not been caused by negligence or misconduct on the part of the Company or their servants.

1. Non-delivery of any package or consignment fully and properly addressed, unless such non-delivery is due to fire or accidents to trains.

2. Pilferage from packages of goods protected otherwise than by paper or other packing readily removable by hand, provided the pilferage is pointed out to a servant of the Company on or before delivery

3. Mis-delivery where goods fully and properly addressed are not tendered to the consignee within twenty-eight days after despatch.

II.—*Perishable Merchandise carried in Passenger Trains (other than Milk in Cans).*—The following addition to be embodied in the consignment note for perishable and other merchandise (other than milk in cans), carried at owner's risk in passenger trains, after the words "wilful misconduct of the Company's servants," viz. :—

But nothing in this agreement shall exempt the Company in the case of perishable merchandise as defined by the Railway Rates and Charges Order Confirmation Acts, 1891-92 (other than milk in cans), from any liability they would otherwise incur in the following cases of non-delivery, pilferage or delay, except on proof that such non-delivery, pilferage or delay has not been caused by negligence or misconduct on the part of the Company or their servants.

1. Non-delivery of any package or consignment, fully and properly addressed, unless such non-delivery is due to fire or accidents to trains.

2. Pilferage from packages of goods protected otherwise than by paper or other packing readily removable by hand, provided the pilferage is pointed out to a servant of the Company on or before delivery.

3. Delay in transit exceeding forty-eight hours of any package or consignment, fully and properly addressed, as a result of which the value of the goods is deteriorated to the extent of three-fourths, if such deterioration is pointed out to a servant of the Company on or before delivery. Provided that in such case the Company's liability shall not exceed one-half the diminution in value of the goods.

III.—*Milk in Cans carried in Passenger Trains.*—The following modification to be embodied in the conditions of carriage for milk in cans carried at owner's risk by passenger train, viz. :—

Except in the case of milk carried oversea nothing in this agreement shall exempt the Company from any liability they would otherwise incur in the following cases of loss or delay, except on proof that such loss or delay has not been caused by negligence or misconduct on the part of the Company or their servants.

1. Loss of milk through non-arrival at the station to which it was consigned of a can fully and properly addressed, unless such non-arrival is due to fire or accidents to trains.

2. Delay in transit exceeding twenty-four hours to the station to which

it was consigned of milk in cans fully and properly addressed, as a result of which the value of the milk is deteriorated to the extent of three-fourths, if such deterioration is pointed out to a servant of the Company on or before receipt by the consignee. Provided that in such case the Company's liability shall not exceed one-half of the diminution in value of the milk.

The Report of the Proceedings of the Board of Agriculture and Fisheries under the Acts relating to Tithe, Copyhold, Inclosure and Commons, Land Drainage, and certain other subjects during the year 1908 has recently been presented to Parliament. (Cd. 4,705, price 2½d.)

**Proceedings under
the Tithe and
other Acts.**

The general result of the proceedings under the Tithe Acts is referred to below, but the Report also contains an account of the applications under these Acts which fell to be dealt with in 1908.

The business arising under the Inclosure and Commons Acts was of more than usual interest and importance. Not since 1905 had the Board been called upon to make a Provisional Order under the Commons Act, 1876, and consequently the scheme for the Regulation of Towyn Trewan Common was the first which had been submitted to the present Parliament. Applications for Provisional Orders for the regulation under the Act of 1876 of two other commons in Berkshire and Westmorland respectively were also under consideration at the end of the year. Seven schemes for the regulation and management of commons under the Commons Act, 1899, were also approved by the Board during the year.

A complete list of the commons which have been inclosed or regulated under either of these Acts is given, from which it appears that, from 1878 to 1904, 28 commons were the subject of inclosure under the Act of 1876, involving the allotment in severalty of about 30,000 acres previously in common fields or subject to common rights. During the period 1880 to 1908, Provisional Orders for the regulations of 32 commons under the Act of 1876 have been confirmed by Parliament, the extent of land thus preserved for public use being altogether 34,279 acres. Under the provisions of the Commons Act, 1899, the number of schemes submitted

and approved by the Board has been 68, or more than twice as many in ten years as under the Act of 1876 in 30 years. The simplicity of the proceedings under this Act compares favourably with the complexity of those under the Act of 1876, and the possibility of some simplification of the methods laid down in the Act of 1876 is referred to in connection with a recommendation by the Select Committee on Commons which sat last Session, to the effect that the whole procedure under the Commons Inclosure Acts should be referred to a Select Committee of the House of Commons to consider what legislation (if any) is needed for improving the same.

The Report gives an account of the action in regard to the various applications received during the year under these Acts and also under certain other Acts administered by the Board.

The Board of Agriculture and Fisheries are charged with the administration of the Tithe Acts as successors of the Tithe Commissioners appointed in 1836. The total amount of tithe rentcharge on the land of England and Wales was by the original commutation £4,054,405, but this has been subject to continuous reduction since that date. In the Tithe Act, 1836, provision was made whereby the owner of land who was also the owner of the tithes arising out of such land could merge and extinguish the tithe by deed or declaration. This power was extended by subsequent enactments, and the result has been that an amount of £137,643 (of which £46,559 was unapportioned and £91,084 apportioned rentcharge) has been merged and extinguished. Provision for the redemption of tithe rentcharge was first made in the Tithe Act, 1846, and further reductions to the total amount of £58,229, of which £668 was unapportioned, have been made by this process. By the operation of the Extraordinary Tithe Acts, some further sums have been removed from the category of tithe rentcharge, but, on the other hand, rentcharges have been substituted for corn rents and money payments awarded in lieu of tithes under the provisions of certain local Inclosure Acts. The net result of these various transactions has been to reduce the total

amount of apportioned tithe rentcharge at the present time to £3,711,498. The actual value, however, fluctuates, being determined from year to year by the septennial averages of the price of grain. At the present value it now amounts to £2,595,154, or about 70 per cent. of the apportioned amount. The septennial average, as calculated under the provisions of the Corn Returns Act, 1882, shows that the value of £100 of tithe rentcharge for the year 1909 is £69 18s. 5½d.

SUMMARY OF AGRICULTURAL EXPERIMENTS

EXPERIMENTS WITH ROOT CROPS (*continued*).

Manuring of Mangolds on Black Fenland (Camb. Univ., Dept. of Agric., Farmers' Bull. No. 6)—This experiment, in conjunction with other experiments in manuring peaty soils, was carried out in 1898-9 on different types of fenland at three centres in the Isle of Ely and Huntingdonshire. These black peaty soils contain sometimes as much as 1½ per cent. of nitrogen and ½ per cent. of potash. Though analyses do not suggest a deficiency of phosphates, yet in practice phosphatic manures are found to increase the yield of crops, and superphosphate gives better results than other phosphates. The object of this experiment was to find out how much superphosphate could be profitably employed, and whether an addition of nitrogen or potash to the superphosphate would increase the profits.

The largest yield (22 tons 6 cwt) was produced by 3 cwt superphosphate, 2 cwt. nitrate of soda, and 1 cwt. muriate of potash. Valuing the mangolds at 7s. per ton, the profit over the unmanured plot was 39s. Without the potash the yield was 21 tons 18 cwt, and owing to the smaller cost of manure the profit was increased to 45s. 6d. The greatest profit (58s. 6d) was made with 6 cwt. superphosphate alone, a yield of 21 tons 13 cwt being obtained in this case. The results suggest that for mangolds on black soils, a heavy dressing of superphosphate at sowing, with a top dressing of nitrate of soda after singling, will generally be the most profitable system of manuring. The addition of common salt proved harmful at each of the centres.

Manuring of Swedes (Rothamsted Expt. Stat., Ann. Report, 1908).—Swedes were sown after the failure of mangolds on land on which no swedes had been grown since 1870, and the results of the different systems of manuring are given.

Manuring of Swedes (Harper-Adams Agric. Coll., Field Expts., 1908).—Experiments were carried out at three centres in Staffordshire on behalf of the County Education Committee. One experiment was intended to test the relative values of sulphate of ammonia, calcium cyanamide, and nitrate of soda as a source of nitrogen to the swede crop, the same amount of nitrogen being applied in each case, in addition to 4 cwt. steamed bones, 3 cwt. superphosphate, and 2 cwt. kainit. Nitrate of soda gave the heaviest yield, while sulphate of ammonia gave a slightly better return than calcium cyanamide.

Manuring of Swedes (Cumberland and Westmorland Farm School, 12th Ann. Report, 1907-8).—One trial was to test the relative cropping and feeding values of swedes grown respectively with superphosphate and basic slag. One half-acre plot was manured with $\frac{1}{2}$ cwt. nitrate of soda, 1 cwt. kainit, and 3 cwt. basic slag, and another with the same quantities of nitrate and kainit, and $2\frac{1}{2}$ cwt. superphosphate, the cost being the same in both cases. Half of each crop was weighed, and the superphosphate plot produced at the rate of 23 tons $2\frac{1}{2}$ cwt. per acre, and the slag plot at the rate of 23 tons 11 cwt. The other half of each plot was eaten off by 20 sheep, when the gain in seven weeks of those on the superphosphate plot was 2 cwt. 0 qr. 10 lb., and on the other 2 cwt. 2 qr. 24 lb., an increase in favour of slag of 70 lb. live weight.

In another experiment, a plot manured with 12 tons farmyard manure per acre gave a yield of 27 tons 12 cwt.; the addition of $\frac{1}{2}$ cwt. nitrate of soda, $\frac{1}{2}$ cwt. kainit, and $1\frac{1}{2}$ cwt. superphosphate increased the yield to 32 $\frac{1}{2}$ tons. Larger dressings of artificials without farmyard manure produced smaller crops.

Growth of Sugar Beet (Midland Agric. and Dairy Coll., Repts. on Expts., 1907-8).—Trials were carried out in Lincolnshire in 1906 and 1907 to test the suitability of the district for sugar beet growing. In 1907 the land was prepared in the same way as for mangolds and dressed with 1 cwt. sulphate of ammonia, 3 cwt. superphosphate, $\frac{1}{2}$ cwt. sulphate of potash. The seed was sown on the flat, this having been found in 1906 preferable to growing on the ridge. The rows were drilled 12, 15, 18, and 21 inches apart.

Part of the crops was lifted and weighed in October and part in November, in order to find whether the sugar content of the roots increased when approaching maturity. The average yields were—with 12 in. drills, lifted in October 15 tons 18 $\frac{1}{2}$ cwt., lifted in November 17 tons 1 $\frac{1}{2}$ cwt.; with 15 in. drills, October 14 tons 13 $\frac{1}{2}$ cwt., November 14 tons 13 cwt.; with 18 in. and 21 in. drills the yields were smaller. The trials, therefore, are regarded as showing that it is most profitable to grow sugar beet in drills as near together as is consistent with convenient cultivation.

On analysis of samples of the roots it was found that in a damp and cold season, like 1907, a considerable advantage is to be gained by delaying the lifting of the roots as long as possible, for in every case the roots lifted in November contained a higher percentage of sugar than those lifted in October. The percentage of sugar was somewhat less with the drills 12 in. apart than with the wider rows, but owing to the larger crop the total yield of sugar per acre was considerably greater.

Manuring of Turnips (Dept. of Agric. and Tech. Instr. for Ireland, Rept. on Expts. in Co. Antrim during 1908).—Previous experiments had shown that when farmyard manure is scarce a smaller dressing than usual, supplemented by artificials, will give quite as heavy a crop as a heavier dressing of farmyard manure alone. This experiment was designed to find out what quantity of phosphate could in this way be profitably used to supplement 10 tons per acre of farmyard manure. Six plots received this quantity of manure, and in addition 4, 5, or 6 cwt. of superphosphate or basic slag.

Taking the plot that received 10 tons dung and 4 cwt. superphosphate

as a standard, the three plots that received basic slag all resulted in a loss; 5 cwt. superphosphate gave a gain of 2s. 10d. per acre and 6 cwt. superphosphate a gain of 10s. 11d. per acre.

Another experiment tested the quantity of artificial manures alone that could be profitably applied. A dressing of 4 cwt. superphosphate, 1 cwt. sulphate of ammonia, and 3 cwt. kainit was taken as the standard, and on other plots the superphosphate was increased to 5 or 6 cwt., or replaced by 4, 5, or 6 cwt. of basic slag. All the variations gave a profit over the standard plot, the heavier dressings giving the better results. The average profit was greatest on the slag plots, but the results showed that the soil itself was the chief factor in deciding whether the better crop could be obtained from superphosphate or slag.

In another experiment four different sources of nitrogen were compared. Four plots were manured with 6 cwt. superphosphate, 3 cwt. kainit, and in addition one of the following dressings was applied in each case:—1 cwt. sulphate of ammonia, $1\frac{1}{2}$ cwt. nitrate of soda, $1\frac{1}{2}$ cwt. nitrate of lime, and 1 cwt. calcium cyanamide, these all containing the same amount of nitrogen. The yields were all about $25\frac{1}{2}$ to $26\frac{1}{2}$ tons per acre, the results from sulphate of ammonia and calcium cyanamide being slightly better than from the other two.

Varieties of Swedes and Turnips (Dept. of Agric. and Tech. Instr. for Ireland, Rept. on Expts. in Co. Antrim in 1908).—These trials have been carried on for six years. In 1908 the heaviest yield of swedes (21 tons 12 cwt.) was obtained from M'Ervel's Victor. This variety has given the heaviest crop in four out of the six years. In turnips Sutton's Centenary took the first place with 34 tons 9 cwt., a position which it has held five years out of the six.

EXPERIMENTS WITH POTATOES.

Varieties of Potatoes (Herts. C.C., Leaflets Nos. 6 and 7).—In 1907 and 1908 trials with 15 varieties of potatoes were conducted by Cambridge University Department of Agriculture on a farm at St. Albans. The plots were $\frac{1}{20}$ acre in size and were duplicated. In 1907, 20 tons of London dung per acre were applied. The highest yields were: Tyne Kidney (8 tons 17 cwt.), Factor (8 tons 14 cwt.), Up-to-Date (8 tons 4 cwt.), Table Talk (8 tons 1 cwt.). Tyne Kidney gave the largest yield, as it did in the previous year, but it cannot be strongly recommended, as in previous seasons it has not kept well when clamped. The highest proportion of diseased potatoes was yielded by Factor and Up-to-Date, 10 cwt. and 12 cwt. respectively, while Evergood and Royal Kidney, with total yields of 7 tons 16 cwt. and 6 tons 16 cwt. respectively, were practically free from disease.

In 1908 the manures used, on a different field, were 10 tons London dung, 2 cwt. superphosphate, 1 cwt. sulphate of potash. Scotch, Irish, and in one case German seed was planted. The order of the varieties according to total yield was:—Factor, Northern Star, Up-to-Date, British Queen, Royal Kidney. Up-to-Date and Factor showed the most disease, and Northern Star and Royal Kidney the least.

Varieties of Potatoes (Univ. Coll. of N. Wales, Bangor, Bull. IX., 1908).—Sixteen varieties were compared on the farm at Madryn. The land was manured with 12 tons farmyard manure, 3 cwt. superphos-

phate, 3 cwt. kainit, $\frac{1}{2}$ cwt. sulphate of ammonia per acre. The seed in every case was from potatoes grown at Madryn in the previous year. The heaviest yields of marketable potatoes were given by:—Premier (14 tons 1 cwt.), Dalmeny Regent (14 tons), Dalmeny Beauty (12 tons 19 cwt.), Table Talk (12 tons 18 cwt.), and British Queen (12 tons 13 cwt.). Up-to-Date usually does well at Madryn, but in 1908 the crop was 8 tons 17 cwt. A report on the cooking quality of all the varieties is given, and is most favourable in the case of Up-to-Date, British Queen, and Dalmeny Radium.

Varieties of Potatoes (Edinburgh and E. of Scotland Coll. of Agric., Bull. XVII.).—Experiments arranged to ascertain the most suitable varieties of First Early, Second Early, and Maincrop potatoes for the College district were conducted at one centre in 1906, at two centres in 1907, and one centre in 1908, and the results of the three years' trials are dealt with in this report. A test was made of the cooking quality of each variety.

First Early Varieties.—Thirteen varieties were tested, and on the average of the four trials the best yields were Sharpe's Express (9 tons 2 cwt.), Conquest (8 tons 18 cwt.), Epicure (8 tons 1 cwt.). The cooking quality of the first two was excellent, and of the Epicure good. In addition Midlothian Early (7 tons 13 cwt.) and Duke of York (7 tons 11 cwt.) showed themselves fair croppers of good quality, and are worthy of attention as being earlier than any of the varieties mentioned.

Second Early Varieties.—British Queen, which is well known and appreciated, was adopted as a standard of comparison, the object being to discover a better variety. The best average yields in three trials out of 14 varieties were Cottar (11 tons 13 cwt.), Dalmeny Acme (11 tons 8 cwt.), and Johnston's Diamond (11 tons), British Queen producing 10 tons 3 cwt. The conclusion is reached that the three first mentioned have, taking into account quality and liability to disease, done considerably better on the whole than British Queen, and can be recommended to growers as worth trying.

Late and Maincrop Varieties.—Twenty-one varieties were tested. Of these, sixteen were of the Up-to-Date type, being generally characterised by a high yield combined with indifferent quality, and five of the Langworthy type, with a much lower yield but of fine quality. Of the Up-to-Date type the heaviest croppers (average of three trials) were Factor (13 tons 7 cwt.), Dalhousie (13 tons), Dalmeny Hero (12 tons 13 cwt.), Table Talk (12 tons 8 cwt.), Mayfield Blossom (12 tons 5 cwt.), Pink Blossom (11 tons 19 cwt.), Dalmeny Regent (11 tons 19 cwt.), Dalmeny Beauty (11 tons 16 cwt.), Up-to-Date (11 tons 8 cwt.). The cooking quality of all was equal, and is described as "good." These varieties were practically indistinguishable from Up-to-Date except in cropping power, but this difference occurred regularly at each centre in the case of Factor, Dalhousie, Dalmeny Hero, and Table Talk. It is pointed out that the varieties that surpass Up-to-Date have done so, with practically uniform regularity, during a number of years at a number of centres. For instance, Factor and Pink Blossom have been grown for six years in succession at several centres with this result. This is particularly interesting in view of the difficulty of drawing any other distinction between these varieties.

Of varieties of the Langworthy type, What's Wanted gave 8 tons 13 cwt. and Langworthy 8 tons 8 cwt. The quality was excellent. In comparing the two types it is observed that a very much higher price per ton must be obtained for Langworthy if it is to be as profitable as Up-to-Date. The relative proportion of ware is little more than 5 to 8, and the seed-sized tubers of Langworthy generally bring less than those of Up-to-Date, as they are not in request for the English seed trade.

Varieties of Potatoes (Monmouthshire Agric. Educ., Potato Trials, 1908).—Trials were made of 38 varieties. Of the early varieties, Ninetyfold, Webber's Early, and Eclipse gave the best results. The yield from Ninetyfold was very heavy, and this potato and Webber's Early were also extremely good cookers. Eldorado, Russet Queen, and Royal Kidney (Irish seed) gave the heaviest yields in the Second Early section. None of these three were reported on very favourably, however, in the cooking tests. Of the Maincrop varieties, Up-to-Date (Irish), Irish Queen, and Mayfield Blossom (Scotch) gave the heaviest crop, the Irish Up-to-Date being the heaviest cropping potatoes grown at the trials.

Manuring of Potatoes (Herts. C.C. Leaflets 6 and 7).—This experiment was carried out by Cambridge University Department of Agriculture in 1907 and 1908 on a farm at St. Albans. The cost of the manures used is given in the report, and the potatoes were valued at 40s. per ton in order to show the profit or loss due to the dressings. In 1907, 20 tons of London dung gave the largest as well as the most profitable crops. With complete artificials supplying 40 lb. nitrogen, 60 lb. phosphoric acid, and 80 lb. potash per acre, or approximately $1\frac{1}{2}$ cwt. sulphate of ammonia, $3\frac{1}{2}$ cwt. superphosphate, and $1\frac{1}{2}$ cwt. sulphate of potash, the crop was less, but owing to the lower cost of manure it was almost as profitable. Ten tons of dung supplemented with half the artificials mentioned above gave similar results. The effect of leaving out either the phosphates or nitrogen from the dressing of artificials was disastrous, the crops being little better than that on the unmanured plot. In 1908, owing to a good season and the high condition of the land, the difference between the crops on the unmanured and manured plots was slight, and in consequence none of the manures resulted in a profit. On land in such good condition the smaller dressing (10 tons) of dung, supplemented by a complete mixture of artificials, was more economical than 20 tons of dung alone. Leaving out nitrogen from the dressings of artificials reduced the yield to practically the same as that of the unmanured plot, but the absence of either potash or phosphates had little effect.

Manuring of Potatoes (Univ. Coll. of N. Wales, Bangor, Bull. 8, 1908).—The average results are given from similar experiments carried out at six centres. With no manure the average crop of marketable potatoes was 5 tons. Ten tons of farmyard manure produced an increase of $2\frac{1}{2}$ tons, and an additional 10 tons produced a further increase of $1\frac{1}{2}$ tons, which would barely pay for the extra manure. A light complete dressing of artificials, in addition to 10 tons of farmyard manure, viz., 101 lb. sulphate of ammonia, 262 lb. superphosphate, and 82 lb. sulphate of potash, costing £1 6s. 3d. per acre, produced an increase of 1 ton 13 cwt. per acre of marketable potatoes, while double the quantity gave a further increase of 1 ton 5 cwt. Leaving out the

potash, nitrogen, or phosphates from the lighter of these dressings in each case resulted in a greater loss than would be recouped by the saving in the cost of manure. Artificials alone—202 lb. sulphate of ammonia, 524 lb. superphosphate, and 164 lb. sulphate of potash, costing £2 12s. 6d. per acre—increased the yield by 3 tons 12 cwt. of marketable potatoes, thus showing that where farmyard manure is not available, it is possible to grow a good crop of potatoes by the use of suitable artificials alone.

Manuring of Potatoes (Lancs. C.C., Education Committee, Farmers' Bull. No. 13).—Pot experiments were conducted with potatoes in 1908, in order to show in a practical manner the effect upon plants of complete and incomplete dressings of artificial manures. The potatoes were planted in a soil made up of five parts of pure sand and one part of earth, and nitrogen, potash, and phosphates were supplied, singly and in combination. The results upon the growth of the plants are described in this report and shown by photographs.

Experiments in the field have been conducted for five seasons at a large number of centres throughout Lancashire. The results are collected together in this report, and the following recommendations to growers of potatoes in the county are made:—

Farmyard Manure alone.—A dressing of 20 tons per acre can be recommended for potatoes on land in moderately good condition. Where, however, the land is in good condition, it may be more profitable to apply a lighter dressing.

Artificial Manures alone.—Satisfactory crops of potatoes can be grown with artificial manures alone, but this course cannot be generally recommended. Artificial manures, however, might be used as an occasional dressing for a particular breadth of land where, for example, farmyard manure could not be procured. They might also be occasionally used on land well stored with humus (e.g., black soils), and on those soils which have been liberally treated with farmyard manure in previous years. The following mixture can be recommended per acre:—Sulphate of ammonia, 2½ cwt.; superphosphate, 6 cwt.; muriate of potash, 2 cwt.; costing about 66s.

Farmyard Manure in conjunction with Artificial Manures.—For the production of the largest and most profitable crops, a moderate dressing of farmyard manure in conjunction with a suitable dressing of artificial manures can be recommended, and for general application the following may be employed per acre:—Farmyard manure, 10 tons; sulphate of ammonia, 1 cwt.; superphosphate, 4 cwt.; muriate of potash, 1 cwt.; artificials only costing about 33s. Where no advantage arises from the inclusion of a potassic manure, as might be the case on strong soils, the muriate of potash should be omitted. On rich black land the quantities of sulphate of ammonia recommended under each section may be reduced by 25 per cent. and in some cases by 50 per cent.

Manuring of Potatoes (Edinburgh and E. of Scotland Coll. of Agric., Bull. 17).—Lime nitrogen (calcium cyanamide) was compared with sulphate of ammonia at two centres in 1907. The land was liberally dressed with farmyard manure in the autumn, and the artificial manures broadcasted on the drills at planting. The latter were 4 cwt. superphosphate, 1 cwt. sulphate of potash, and on one plot 1 cwt. sulphate of ammonia, on the other 129 lb. lime nitrogen, containing the

same amount of nitrogen. The sulphate of ammonia mixture produced an increase in the crop of 3 tons 4 cwt. over a plot with farmyard manure only, and lime nitrogen an increase of 3 tons, so that the latter proved to be nearly as efficient a source of nitrogen as the former.

In experiments at a number of centres the effect of farmyard manure alone and a smaller quantity in conjunction with artificials was compared. The addition of 1 cwt. sulphate of ammonia, 2 cwt. superphosphate, and 1 cwt. sulphate of potash to 10 tons of farmyard manure resulted in practically as good a crop as double the quantity of farmyard manure without the artificials. The addition of a complete dressing of artificial manures was always found to repay amply the expense of the manures.

The effect of ground lime and carbonate of magnesia when used with complete artificial manures was investigated, and neither was found profitable. Basic slag was also compared with superphosphate, and various potassic manures were compared, but the results are described as inconclusive.

Potatoes were grown at two centres with the mixture recommended in the Board's leaflet No. 80, p. 6. Satisfactory returns were obtained, but at a somewhat greater cost than with two other mixtures.

FOREIGN AND COLONIAL EXPERIMENTS.

Fishy Flavour in Butter (Bureau of Animal Indust., U.S. Dept. of Agric., Circ. 146, 1909). Butter, like other dairy products, sometimes suffers a depreciation in value owing to the occurrence of some undesirable flavour, one of the most troublesome, though not the most common, of which is that known as "fishy flavour." The matter was referred to in this *Journal* in July, 1904, and June, 1901, where an account was given of the investigations of Mr. O'Callaghan, Dairy Expert to the New South Wales Department of Agriculture. This writer held that the noxious fishy flavour occasionally prevalent in Australian butter was due to a small mould, *Oidium lactis*, which was said to grow conjointly with the ordinary organism which causes the souring of milk. Mr. O'Callaghan stated that he had always found the organism *Oidium lactis* present in the fishy butter examined by him, and had imparted the flavour to butter by adding pure cultures of this mould to sterilised cream.

Since that date investigations into the subject have been conducted by Mr. L. A. Rogers, Bacteriologist in the Dairy Division of the United States Department of Agriculture, who observes that the various oily flavours, which may be regarded as the most objectionable and troublesome flavours of butter, range from a slight suggestion of an oil to a strong flavour of machine oil. In the latter case the inferior quality of the butter becomes evident even to the indifferent consumer. Fishy flavour gives to butter a peculiar oily taste, suggestive of mackerel or salmon, though butter is frequently described as fishy which is merely oily or otherwise off flavour. The typical flavour of fishy butter, however, is never mistaken for any other. In one region of the United States the trouble occurs so frequently that it is spoken of in Chicago as the "fishy belt."

There are in the United States many creameries where fishy flavour

appears year after year, although many of them use the most approved machinery and methods, and are managed by competent butter makers.

Fishy flavour may develop in butter within a week or ten days after making, or it may not appear until the butter has been several months in storage. In the warm summer months butter is frequently fishy when it reaches the commission merchant. The condition may occur in one shipment only or in a few tubs in a shipment, but it is not uncommon for the trouble to persist in a creamery for days or even weeks. Where this happens it is almost always during or following warm weather, and it is generally believed that fishy flavour is most common in hot, rainy seasons.

The most serious loss is caused in the case of butter held in cold storage, and although low temperatures retard the development of fishy flavour they do not prevent it. It was found that at 32° F. there is little retarding influence, but at 10° F. its appearance is perceptibly delayed. At 10° below zero the retardation is very marked, but even at this extremely low temperature butter may become fishy.

In the course of his experiments Mr. L. A. Rogers has been unable to confirm the results of Mr. O'Callaghan's investigations, as inoculations with *Oldium lactis* did not produce any flavour resembling fishiness. Many lots of fishy butter have been made in which this fungus was known not to occur, either in the butter or in the cream from which the butter was made. Mr. Rogers concludes that though *Oldium lactis* may be the cause of what is known as "fishy flavour" in Australian butter, and may even occasionally cause the flavour in American butter, it is certainly not the common cause in that country.

Experiment showed that fishy flavour in butter is not actually caused by anything of a basic or of an acid nature, but the results suggested an aldehyde which could be produced in a great variety of decompositions and by many kinds of bacteria. The results obtained also seemed to exclude the possibility of any direct connection between the food of the cows and the presence of fishy flavour in the butter, while it was not found possible to produce fishiness in butter when made under winter conditions. Bacteriological examinations made it evident that there were no unusual varieties of bacteria connected with the production of the bad flavour; but an analysis of all the inoculated butter which developed fishy flavour showed that this flavour always occurred in butter made with an active lactic-acid organism or in which a high degree of acidity had been developed with ordinary lactic-acid bacteria.

In all the experimental butter made in the last three years there has been no trace of fishy flavour in that made from pasteurised sweet cream churned without the addition of a starter; and, on the other hand, fishy flavour was produced with reasonable certainty by overworking the butter made from sour cream.

In conclusion, Mr. Rogers expresses the opinion that fishy flavour is caused by a slow, spontaneous chemical change to which acid is essential, and which is favoured by the presence of small amounts of oxygen. The flavour, he states, may be prevented with certainty by making butter from pasteurised sweet cream; and butter made from such cream with a starter, but without ripening, seldom if ever becomes fishy.

In Denmark the trouble is less prevalent than formerly, and this has

probably been brought about, not by greater care in the selection of starters, but by making a mild-flavoured butter from pasteurised cream ripened to a low degree of acidity. The presence of *Oidium lactis* in Australian butter may be considered, not as the cause of fishiness, but merely as an indication that the butter was made from high-acid cream, a condition which is well known to favour the growth of this organism.

In considering the practical application of these investigations, it may be said that the butter maker who receives whole milk or fresh sweet cream can prevent the appearance of this trouble with certainty. High-grade butter with a low acidity may be made by adding a good starter to pasteurised cream and churning without ripening, or the pasteurised cream may be churned sweet without the addition of any starter. In creameries receiving hand-separator cream in which the acid is well developed, the problem is more difficult, and under such conditions it may be impossible to prevent fishy flavour. The amount of working, however, which the butter receives is almost entirely under the control of the butter maker, and overworking should be avoided.

Destruction of Red Spider by Spraying (*Journal of Economic Entomology, Concord, N.H., Vol. I., No. 6, December, 1908*). The damage done by red spiders in Great Britain is very extensive (Leaflet No. 41), and any method which is likely to prove effective in controlling their multiplication and spread is of interest to the horticulturist. In the *Journal of Economic Entomology* Mr. H. M. Russell, of the Bureau of Entomology, Washington, gives a short account of experiments conducted in Florida with a view to control the red spider *Tetranychus bimaculatus*, Harv. The spring of 1908 being very dry for some weeks, with little rainfall, injury by red spider was very noticeable. The experiments were conducted in a small field of wax beans which were very badly infested.

On May 22nd a row was sprayed with lime-sulphur at the rate of 1 lb. lime and 1 lb. sulphur to 25 gallons of water, the lime and sulphur being boiled together in a portion of the water. A comparison with unsprayed plants on May 28th showed that 76 per cent. of the red spiders had been killed by the one spraying. The plants were uninjured by the spray.

On May 28th a row of the beans was sprayed with lye-sulphur (1 lb. sulphur and $\frac{1}{2}$ lb. lye in 40 gallons of water), and on May 30th comparison with unsprayed plants showed that no less than 98.4 per cent. of the red spiders had been killed, the plants being uninjured.

In another case a row was sprayed with sulphur in water (1 oz. to 1 gallon of water), and it was found that 91.7 per cent. of the red spiders had been destroyed.

Kerosene-soap emulsion was also tried, and an examination the following day showed that 95 per cent. of the red spiders were killed. The plants showed a few leaves with burned edges, but this was not serious.

In all cases the beans were sprayed below as well as above.

Observation was also made as to the effect of rain on the red spiders, and it was observed that heavy rain for one day only did not seriously affect the pests, but continuous rain for several days appeared to be fatal to a large proportion of them.

OFFICIAL NOTICES AND CIRCULARS.

Enquiries are frequently addressed to the Board for information as to the whereabouts of awards under which inclosures of land in England and Wales were effected prior to the Inclosure

**Custody of
Inclosure Awards.**

Act of 1845.

All such awards subsequent to the Act of 1845 are in the custody of the Board, and copies thereof are deposited with the Clerk of the Peace for the County concerned, and also with the Churchwardens of the parish or their successors in title. A list of the Awards under that Act made up to the year 1893 is contained in a House of Commons Return (455 of 1893). Awards made under Acts passed between the General Inclosure Act, 1801, and the Inclosure Act, 1845, were in the absence of other provision in the authorising Act, to be enrolled in one of His Majesty's Courts of Record at Westminster, or with the Clerk of the Peace for the County, and enquiries as to their present place of deposit and as to opportunity of inspecting them may be addressed to the Public Record Office, Chancery Lane, London, W.C. The place of deposit of Awards made under Acts prior to, or not governed by, the General Inclosure Act, 1801, can be discovered only from inspection of the particular provisions of each Act. In many cases these private Acts were not printed, and it would probably be difficult to discover any existing copy of some Acts. Lists of local Inclosure Acts from 1727 to 1834 are contained in George Bramwell's *Analytical Table of Private Statutes* (2 vols., London: 1813 and 1835). Reference to the *Index of Local Acts, 1801-1899* (H.M. Stationery Office: 1900) may also be useful in an endeavour to trace information.

It will be seen that considerable difficulty may be experienced in tracing the Awards of Inclosure bearing date prior to 1845. Many of them are included in the House of Commons Return (No. 50 of 1904) of Inclosure Awards deposited with Clerks of the Peace or Clerks of County Councils, who may possibly in certain cases be in a position to supplement the information contained in that Return. Where this source of information fails, it may sometimes be possible to obtain particulars from the Steward of the Manor or from the Parish Council or Incumbent of the Parish concerned.

A certain number of Inclosure Awards, or copies thereof, are in the custody of the Public Record Office, His Majesty's Commissioners of Woods and Forests, and the Ecclesiastical Commissioners. At the Public Record Office are kept those Awards which were transferred from the Royal Courts of Justice and from the Duchy of Lancaster Office, as well as those transferred with the Land Revenue Records from the Office of Woods and Forests. The Commissioners of Woods and Forests have information only as to the whereabouts of such Awards as affect Crown property.

A very few Awards relating to lands in Middlesex are in the keeping of the Land Registry, as successors to the Middlesex Registry of Deeds; and some relating to lands in Yorkshire (East, North, and West Ridings) are at the Registries of Deeds at Beverley, Northallerton, and Wakefield respectively. There is reason to believe that some Inclosure

Awards have found their way into private hands, while a small number are included in the collections of Manuscripts at the British Museum.

The War Office has issued the following summary of the regulations governing the farming out of army horses: (1) The horse, which will

**The Farming Out
of Army Horses.**

remain for all intents and purposes the property of the Crown, must be properly fed and cared for, all expenses incurred thereby, including veterinary charges, being borne by the recipient. (2) The horse may not be let out for hire, but may be used for any legitimate purpose, riding or draught, except that it must not be used for carting heavy loads, for ploughing, or for any other work which, in the opinion of the officer commanding the cavalry regiment at the station from which the horse was issued, would interfere with its military efficiency. (3) The horse will at all times be liable to inspection by the commanding officer or an officer deputed by him. (4) Any casualty to, or serious ailment of, the horse must be immediately notified to the commanding officer. In the case of death or injury due to circumstances which, in the opinion of the Army Council, have arisen out of neglect or improper treatment, the recipient will be liable to pay compensation not exceeding £40 as fixed by the Army Council, who are the sole and final judges in all such cases. (5) The recipient must take out at his own expense in the name of the Secretary of State for War a policy of insurance for £40 against the death of the horse from accident or disease; this policy must be lodged with the commanding officer. (6) The horse must, if required, be placed at the disposal of the military authorities for a period of not more than a month each year for military training, subject to fourteen days' notice being given. It must be given up for mobilisation purposes whenever claimed, or if, in the opinion of the commanding officer, it is not keeping in good condition, or is no longer suitable for military requirements. (7) One month from the date of receipt will be allowed the recipient in which to decide whether or not he will take the horse. The agreement is made for one year, and after that time is terminable at a month's notice on either side. The schedule to the form of agreement provides for a description of the horse as to size, colour, sex, age, height, marks, army number, and source of issue.

The Department of Agriculture and Technical Instruction for Ireland have made regulations under the Bee Pest Prevention (Ireland) Act, 1908,* and they take effect from June 3rd, 1909.

**Bee Pest Prevention
(Ireland)**

Regulations, 1909.

The notice of disease which is required by Section 1 of the Act to be given by a bee-keeper, must be in writing and signed by him, and addressed to the Executive Officer of the Local Authority.

The regulations provide that on entering any premises in which bees are kept, the Inspector may take such steps as in his opinion may be necessary to determine whether the disease exists or has recently existed on said premises, and must, without delay, forward to the Department

* See *Journal*, Vol. XV., September, 1908, p. 456.

or to the Local Authority, as the case may be, a report on the facts of the case. If Foul Brood is found to exist on the premises inspected, the report is to contain a short and concise statement of the method of treatment, if any, which the Inspector recommends should be carried out by the bee-keeper. If the Inspector in his report advises destruction, he is also to state, approximately, the amount, if any, payable in accordance with the scale of compensation, if any, adopted by the Local Authority.

The Local Authority is to decide as to the action to be taken in each case reported by their Inspector, and to cause to be served on the bee-keeper, either by their Executive Officer or by the Inspector, a notice in the Form A set out in the Schedule, or as near thereto as practicable, requiring him to carry out within three days from the date of such notice the measures for cleaning, disinfection, and destruction specified therein.

The Department may cause a like notice to be served in cases reported by their Inspector.

The bee-keeper must notify in writing to the Local Authority or to the Department, as the case may be, the date on which he complied with the requirements of the notice.

The Inspector shall take all reasonable precautions to prevent the disease being carried by him from an infected apiary to another apiary, whether infected or not. If the bee-keeper so desires, the Inspector, when inspecting an apiary, shall permit the bee-keeper to manipulate the stocks to be dealt with, provided that the bee-keeper acts in all respects to the Inspector's satisfaction. If necessary for the proper examination of comb in a fixed comb hive, the Inspector may cut out a portion of the brood comb.

Compensation for the destruction of bees, articles, and appliances may be allowed by a Local Authority at a rate not exceeding amounts laid down by the regulations.

Any bee-keeper whose bees, articles, and appliances have been destroyed under these regulations, and who has complied in every respect with the Notice served on him may claim compensation for such destruction from the Local Authority, provided such Local Authority has adopted the resolution referred to in Section 6 (3) of the Act. The Local Authority is to decide as to the amount of compensation.

Compensation is not in any case to be paid by a Local Authority without the written direction of the Department of Agricultural and Technical Instruction for Ireland.

The regulations provide for an annual return of all cases reported to Local Authorities under the Act.

The Board of Agriculture and Fisheries have received information as to damage done to the oat crop during the present year by the Stem Eelworm and the Frit Fly.

Prevalence of Stem Eelworm and Frit Fly. The Board desire to inform farmers that copies of leaflets on the subject may be obtained gratis and post free from the Secretary, Board of Agriculture and Fisheries, 4 Whitehall Place, London, S.W. Letters so addressed need not be stamped.

The Board of Agriculture and Fisheries desire to warn all bee-keepers that an outbreak of disease believed to be identical with the Isle of

**Disease of Bees in
Buckinghamshire.**

Wight Bee Disease has occurred in several hives in Buckinghamshire. This disease, which has destroyed almost all the bees in the island from which it takes its name, is due to a bacillus closely resembling the bacillus of plague, and no remedy for it is known. It is of the utmost importance, therefore, that bee-keepers should take every precaution to prevent the disease from spreading, and they are strongly advised to keep a careful watch for any signs of its appearance. A full description of the disease was published in the Journal of the Board of Agriculture for February, 1909, and bee-keepers who find symptoms of disease corresponding to the description there given should communicate with the Board of Agriculture and Fisheries, 4 Whitehall Place, London, S.W.

IMPORTATION AND OTHER REGULATIONS.

The "Natal Government Gazette" of May 4th last contains a Proclamation (No. 36 of 1909), dated April 26th, 1909, prohibiting, in consequence of the existence of glanders in Cape Colony, the importation therefrom, directly or indirectly, of all horses, mules, and donkeys into Natal.

**Importation of
Horses into Natal.**

Healthy animals may, however, be imported, provided that permission in writing has been first obtained from the Principal Veterinary Surgeon at Pietermaritzburg, and that the animals are subjected to the mallein test at some place in Natal, but should they re-act to the test, then, in terms of Act No. 6 of 1899, such animals will be destroyed and no compensation allowed.

Racehorses in training will be permitted to enter the Colony on a certificate of health signed by a qualified veterinary surgeon, but they, also, will be subjected to the mallein test on arrival at their destination, or at any time thereafter, if found necessary, and no compensation will be payable if they should eventually be destroyed. (*Board of Trade Journal*, June 10th, 1909.)

The "Transvaal Government Gazette Extraordinary" of May 4th last contains the text of a Bill providing for the regulation of the importation of bees, honey (including both honey in combs and extracted honey), and beeswax into the Transvaal.

**Proposed Prohibition
of the Importation
of Bees, Honey and
Beeswax into the
Transvaal.**

It is proposed that no person shall import, or cause to be imported, into the Colony

- (a) bees from any place whatever, without special permission of the Department of Agriculture,
- (b) honey or beeswax from any place outside South Africa,
- (c) used beehives or used beehive accessories or appliances or anything which has been used to contain or manipulate bees or beeswax from any place outside South Africa.

The Governor may allow, by Proclamation, the importation of bees from any colony or territory in South Africa if reciprocal legislation exists therein prohibiting the importation of bees, except under special permission. (*Board of Trade Journal*, June 10th, 1909.)

Regulations as to the importation of honey into Cape Colony were given in this *Journal* in April, 1909, p. 53.

A notice was issued in the "Orange River Colony Gazette" of May 7th last, stating that, under Government Notice No. 68 of 1907, all consignments of potatoes entering the Orange River Colony, or offered for sale, which appear on examination to be affected with the diseases "White Rot" or "Scab" will be confiscated and destroyed.

**Importation of
Diseased Potatoes into
Orange River Colony.**

The attention of merchants and growers is also drawn to the fact that under Transvaal regulations potatoes sent to that Colony and found on examination to be affected with either of the above diseases will be condemned. (*Board of Trade Journal*, June 10th, 1909.)

The "Nyasaland Government Gazette" of April 30th last contains Proclamation No. 48 of 1909 prohibiting, from the date of publication, the importation of potatoes into the Protectorate, in consequence of the prevalence in the United Kingdom and elsewhere of a disease in potatoes known as black scab. (*Board of Trade Journal*, June 17th, 1909.)

**Importation of
Potatoes into Nyasa-
land Prohibited.**

Notices as to the importation of potatoes into Natal were given in this *Journal* for March, 1909, p. 929, and June, 1909, p. 220.

SWEDEN.—In reference to the notice which appeared at p. 53 of the *Journal* for April, 1909, respecting the importation of seeds into Sweden, the Board have received, through the Foreign Office, a copy and translation of a Swedish Royal Order, dated April 26th, prescribing the method by which the Customs authorities are to proceed in treating imported seeds with Eosin. This document may be inspected by persons interested at the Office of the Board of Agriculture and Fisheries, 4 Whitehall Place, S.W.

**Regulations as to
Importation of Seeds.**

AUSTRALIA.—The Board of Trade have been informed by the Representative of the Commonwealth of Australia in London that the Commonwealth Customs Department have decided that, for the purposes of the Australian Commerce (Trade Descriptions) Act, *flower* seeds are not considered to be agricultural seeds, and, consequently, the import provisions of the Commerce Regulations made under that Act are not applicable thereto.

Should, however, any description be voluntarily applied, such flower seeds would be subject to the provisions of the Commerce Regulations, which require that the description shall state the names of the seeds and their condition as to soundness, cleanness, and newness. (*Board of Trade Journal*, June 17th, 1909.)

In accordance with recent legislation (Laws of 3rd and 26th December, 1908 *), the following articles may be imported into the Republic of

**Free Import of
Agricultural Produce
into the
Panama Republic.**

Panama from this country without payment of duty: Pedigree animals for breeding purposes, seeds, cuttings, living plants, guano, and material intended for the purpose of irrigation or agriculture. In order to obtain the exemption, a written application must be made, containing a sworn statement indicating the kind and quantity of the articles proposed to be imported, the country of origin, value and purpose for which they are intended, with an undertaking that they will not be used for any other purpose. Packages will be opened for examination by the Customs. Letters should be addressed to the Secretary to the Finance Department of the Republic as regards imports through the ports of Panama and Colon, and as regards the port of Bocas del Toro to the Governor of that province.

The "Cape of Good Hope Government Gazette" of April 30th publishes a notice to the effect that, in view of the near approach of

**Sale of Sheep and
Cattle Dips in
Cape Colony.**

East African Coast fever, and the desirability of encouraging the use of dips as far as possible, the Cape Government have decided that all sheep and cattle dips shall be exempted from the licence and stamp duty applicable to patent or proprietary medicines until further notice, irrespective of the claims made in regard to the remedial, curative or preventive qualities of such dips.

M. E. Schribaux, Director of the Seed Control Station in Paris, has published (*Journal d'Agriculture Pratique*, February 11th, 1909) a

**Sale of Seeds in
France.**

statement dealing with the law as to seeds containing dodder in France. He calls attention to the fact that certain seed merchants claim that in commerce the term *déscuscuté* (freed from dodder) applied to leguminous seeds means simply that they have passed through a machine for separating dodder. The *Service de la répression des Fraudes*, however, has always refused to admit this interpretation, as likely to deceive the purchaser. The *Service des Fraudes* recognises only samples which are *déscuscutés* and *non déscuscutés*, the former being not only samples sold as free from dodder, but also those which are sold without any definite statement as to the presence or absence of the parasite.

The machinery now in use allows of the complete elimination of small dodder, and also of the large dodder which infests lucerne. In order, however, to allow a margin for error, the *Service des Fraudes* is prepared to allow, in seed offered for sale, a maximum of 10 grains of dodder per kilogram (2.2 lb.) in red clover, lucerne, *Medicago lupulina*, *Anthyllis vulneraria*, and crimson clover (*trifolium*); and 20 grains per

kilogram in white clover, hybrid, or alsike clover, and *Lotus corniculatus* (bird's-foot trefoil).

The Law of December 24th, 1888, authorises prefects to enforce the destruction of dodder in their respective departments. Seeds containing dodder may still be sold, but on the express condition that the sacks bear on the outside in clear characters the words "*non décuscuté*" (not freed from dodder).

MISCELLANEOUS NOTES.

France.—The total weight of agricultural machinery imported into the consular district of Bordeaux in 1908 was 6,946 metric tons, of which 1,056 tons were from the United Kingdom. This shows a decrease on the total importation compared with 1907 of 1,398 tons, and an increase in British machinery of 88 tons.

Demand for Agricultural Machinery Abroad.

Notwithstanding a late hay crop, the sale of mowers and other hay-making implements in 1908 proved an average season, and fair business was done in reapers. The prospects for 1909 are not yet well defined, but appear to be good, considering the orders already booked for harvesting machinery in general. In anticipation of a probable increase in the French customs duties, some firms have placed large orders abroad, so that a considerable increase in imports is likely to be marked in 1909. French mowers, reapers, and binders have hitherto met with little favour, owing to the superiority of British and American implements, but horse rakes, tedders, hoes, and harrows manufactured in the centre of France are steadily displacing imported articles. The British threshing machinery trade has been well maintained against French makers at Vierzon, who accept very low prices. Our tackle is everywhere recognised as being heavier, but better made, and well worth the difference in value, but British makers must expect to find increasing difficulty in keeping this market to themselves. (*F.O. Reports, Annual Series, No. 4,246.*)

Russia.—The British Vice-Consul at Kharkov (Mr. C. Blakey) reports that in 1900 (the last year for which these particulars are available) there were in Russia 159 factories for the manufacture of agricultural machinery, employing 11,151 workmen. Since 1900 the manufacture of agricultural machinery has increased considerably. The Vice-Consul estimates the present yearly output as follows, viz. :—

Articles	Number.	Value
Ploughs	550,000	£792,000
Grain drills	80,000	950,000
Reapers, hand rakes	70,000	844,000
Horsegear and threshers	8,000	169,000
Portable engines	100	32,000
Winnows, chaff-cutters and sundry	—	116,000

£2,903,000

The value of agricultural machinery sold by the County Councils (Zemstvos) in 1904, 1905, and 1906 was 6,616,000 roubles (698,400l.), 7,153,000 roubles (755,000l.), and 6,382,000 roubles (673,700l.), respectively. A falling off in the sales in 1907 and 1908 was expected, owing to the financial straits of the Councils, and their previous losses in the trade. (*Board of Trade Journal, June 17th, 1909.*)

Uruguay.—The Board of Trade have received, through the Foreign Office, telegraphic information to the effect that a Bill is now under the consideration of the Uruguayan Legislature proposing to exempt from Customs duty machinery and utensils for use in dairy factories established in the Republic, with a capital of not less than 2,100*l*. It is also proposed that such factories shall be free of all internal taxes, and that no export duties shall be levied on their products. (*Board of Trade Journal*, June 17th, 1909.)

Machinery for Vine Cultivation.—An international competition for machinery for the cultivation of vines by motor power will be held at Alba (North Italy) in September, 1909. The machines will be required to perform digging, trenching, smoothing, and ridging up the soil round the roots of the vines, and weeding. They must work on a slope of not more than 20 per cent. Two prizes of £240 and £80 will be awarded, and the winning machine will be bought by the Italian Ministry of Agriculture. Applications and particulars of the machines entered should be sent to the Committee of the Agricultural and Industrial Exhibition at Alba, not later than the 1st August, 1909, and the machinery must reach Alba not later than 1st September, 1909. Application for a copy of the decree announcing the competition should be made to the Italian Chamber of Commerce, 4 Saint Mary Axe, London, E.C.

Irrigation in California.—The Report for 1908 on the trade of the Consular District of San Francisco (*F.O. Report, Annual Series, No. 4,227*) states that irrigation has been a

Notes from Foreign Office Reports.

potent factor in the development of the State of California, and is destined to play a still larger part in the future. Through its utilisation, large stretches of territory, once immense grain farms, owned by men who numbered their holdings by thousands of acres, and supporting comparatively few employees, have been converted into 10-, 20-, and 40-acre farms, where the owners, with the assistance of their families, carry on diversified farming, growing fruits and vegetables for the market.

National irrigation systems are constructed with the money received from the sale of public lands within the States in which they are situated. The Reclamation Service constructs the works, and as soon as the actual cost can be computed it is divided by the number of acres of agricultural land to which water can be conducted from the canals. This regulates the price of a settler's farm, because the public lands irrigated by these canals can only be acquired under the Homestead Act. The land itself costs nothing except the filing fees of documents, but the settler must pay his share of the cost of the irrigation system in 10 equal instalments without interest. When the money has been paid back into the Treasury it becomes at once available for the construction of some other system.

Wheat, Barley, and Hop Growing in California.—Experiments are being conducted with a view to develop new varieties of wheat with

a high gluten content which will not deteriorate in the climate of California. The gradually increasing price of wheat is encouraging owners of suitable land to return to wheat growing, and a favourable year would doubtless see a decided increase in the acreage and yield. There has been a small beginning in California of raising wheat under irrigation, and as farmers become familiar with irrigation the output of wheat is expected to increase. The crop of 1908 is estimated at 14,125,000 bushels, against 18,055,550 bushels in 1907.

The yield of barley in California has not only held its own, but is steadily increasing. There are two reasons for this. In the first place, barley requires less time to mature, and can be grown with less rainfall than is required to produce wheat. It can be sown later and harvested earlier. In any ordinary year the rainfall is adequate, even on soil which has very little humus, to mature a good crop of barley; consequently, grain-growers who find wheat unprofitable are turning to barley. California produces barley with excellent brewing qualities, and there is a demand in Europe at remunerative prices for all barley of that variety which can be produced. The most important reason for the increase in the barley crop is, however, that it is an absolute necessity. It is the main crop for stock feed, and grows better here than either maize or oats. The production of barley in 1908 is estimated at 19,750,000 bushels.

The year 1908 was a very unsatisfactory one for hop-growers on the Pacific coast. Over-production for several years had left a large accumulated carry-over, and the brewers allege that the prohibition agitation has lessened the demand for hops. An effort was made early in the year to organise the hop-growers of Washington, Oregon, and California, into an association to control the price and production, but the plans did not mature.

The situation facing the growers at the beginning of the year apparently had some effect, however, and there was a considerable reduction of the acreage cultivated this year in all these States. The production of California is placed at from 65,000 to 68,000 bales, and for the coast 171,500 bales. It will be noted that the decrease in production is very great, the total for the Pacific coast in 1907 having been 255,000 bales. Prices for Californian hops towards the end of the year ruled from 7 c. (3½d.) to 8 c. (4d.) per lb. to the grower.

The Report above mentioned also gives information as to the fruit crop and the production of wine, honey, and wool.

Lectures to Farmers.—An example of the efforts made in the United States to bring instruction to the farmer's door is given in the same Report, which states that a special train, supplied without charge by the Southern Pacific Railroad Co., made a tour of the northern part of the State of California in November, 1908, carrying a body of horticultural and agricultural instructors for the purpose of disseminating scientific information to farmers in all branches of agriculture.

The University of California and the State Horticultural Commission are jointly interested with the railroad company, and are lending their services in the enterprise. They equipped a car with exhibits, which was attached to the train carrying the instructors, in order that the

farmers might be shown the results that could be accomplished by following scientific methods. Some of the subjects treated were "Creamery Practice and Dairying," "Fertilisation and Cover Crops," "Cereals," "Veterinary Matters," "Diseases of Animals."

If the experiment proves successful, the train will be run to all portions of the State and repeat its visits at intervals.

Export of Live Stock from Poland to the United Kingdom.—Mr. Consul Clive Bayley reports (*F.O. Report, Annual Series, No. 4,232*) that there is a growing tendency in agricultural districts in Poland towards forming small societies for the purpose of exporting swine, cattle, and dairy produce to Germany and the United Kingdom. No statistics as to profits are as yet to hand, but there seems to be a good deal of business done. The export of swine to Prussia is also on the increase. The Agricultural Society is doing its best to get small landed proprietors to improve their breed of swine and feed them for the London market, but this project can scarcely be carried out till Warsaw has a central meat market managed on modern lines.

In order to be able to develop their milk trade many farmers import cattle from abroad or buy foreign breeds at home exhibitions. The results, however, are nearly always disappointing, as not only do the good breeds deteriorate as soon as they leave the exhibitors' hands, but their offspring fall below the average of home-bred cattle. The reasons for this are that the farmer buys breeds which are used to high lands and puts them on low pastures, and also that the cattle receive very little care. The Polish farmer thinks all he has to do is to get good cattle from abroad and leave the rest to chance. His own cattle are about the hardiest in the world. They live on straw in winter and the poorest food in summer, and yet their owners manage to get cheese, butter, cream, milk, and meat from them. They are generally surprised that foreign cattle, for which they give high prices, cannot stand this treatment so well, and the Central Agricultural Society is now trying to organise lectures in order that farmers may better understand the treatment of cattle.

The Central Agricultural Society is also considering the possibility of building a central meat market for swine and for the export of pork and bacon to the United Kingdom.

Hop Fair in Poland.—The above report also gives some information as to the hop crop in Poland. Hop growing appears to have been steadily decreasing during the past few years, but an attempt is being made to organise a branch of the Central Agricultural Society for the purpose of encouraging hop growing.

The Warsaw hop fair was opened on October 1st, and lasted three days, as against five days in 1907 and 10 days in previous years. The amount of hops put on sale during the fair was 3,940 cwts. After it was closed additional supplies arrived, which brought the total up to about 4,280 cwts. as against 4,617 cwts. in the preceding year. These figures tend to prove that, in spite of unfavourable conditions, the crop was an average one, as they represent 22½ pouds of 36 lb. per acre.

The fair opened briskly and became very animated later on. As the poorer varieties had suffered most from the wind and rain the demands

were chiefly for better sorts. In general the hops reached the fair in good condition, only about 57 cwts. being damaged.

Polish hops realised from £1 17s. 6d. to £4 10s. per cwt., according to quality, while Volhynian ranged from £2 12s. to £3 12s. per cwt.

An International Agricultural Exhibition will be held at Buenos Ayres from June 3rd to July 31st, 1910. The Exhibition will include all kinds of live stock, and there will also be sections devoted to machinery, implements, vegetable, animal, and industrial products.

**International
Agricultural Exhibi-
tion at Buenos Ayres.**

In view of the great advance made by the Argentine Republic during recent years in agriculture and stock raising, and the large demand for British pedigree live stock, and for agricultural machinery and implements, it is hoped that advantage will be taken of this Exhibition to bring British produce to the notice of Argentine agriculturists.

The live stock show will comprise four sections, viz., breeding stock, fat stock, dairy stock, and draft animals, the show of breeding stock being held from 3rd to 25th June, and that of fat stock from 9th to 14th July. Horses, cattle, sheep, pigs, goats, dogs, poultry, and "other domestic and tame animals" can be shown. Prizes both of medals and in cash will be awarded, and public sales will be held by auction of the animals exhibited or they may be disposed of privately.

Entries and applications for space will be received from abroad for live stock up to 1st February, 1910, and for other exhibits up to 1st November, 1909. They may be addressed to the Secretary of the Exhibition at Buenos Ayres or to the Argentine Consul-General. Copies of the programme and rules of the Exhibition, and forms of entry, may be obtained from the Argentine Consul-General, 3 Budge Row, E.C. The agricultural part of the exhibition, other than the live stock show, will comprise the following sections:—

Geology, &c.—This section comprises exhibits showing the physical characteristics and resources of Argentina. Exhibits of manures and meteorological instruments are included.

Machinery and Implements.—Machinery and implements for use in agriculture, fruit growing, and horticulture; flour milling, bread making, grape growing and wine making, brewing, and sugar making machinery; and generally exhibits of implements and utensils employed in all branches of agriculture and its allied industries.

Rural Engineering.—This section includes plans, models, &c., of irrigation and drainage works, buildings, water supply, and landscape gardening.

Agricultural Plant Products.—This includes samples of all kinds of crops, specimens of woods, and collections of plants.

Animal Products.—Exhibits of wool, dairy products, meat and meat products, honey and wax, are included under this head.

Industrial Products.—This includes flour, sugar, wines and other beverages, oils, cakes, &c.

Means of Promoting Agriculture.—In this section matters relating to

rural statistics, agricultural education, plant diseases, and veterinary science, will be shown.

Special Seed Section.—This section is confined to the exhibition of selected seed specially prepared for sowing.

Exhibits will be admitted free of duty, but if sold within the country duty must be paid before removal from the Exhibition.

The weather in the *first* week of June opened fine and bright in the southern and eastern districts, but thereafter became unsettled in all parts of the country, and heavy and continuous falls of rain occurred in the south of England. The rainfall was in excess of the average in all districts except England N.E., where it was deficient, and in Scotland N., while it was

**Notes on the Weather
and the Crops
in June.**

largely in excess in the eastern and southern counties. Bright sunshine was generally deficient, being "scanty" or "very scanty" in all districts but the north and west of Scotland, where it was "moderate." Temperature was below the average, the deficiency being rather large in the south-eastern and south-western counties. Slight ground frost was experienced at many northern stations, the lowest temperatures recorded being 28° at Burnley and 29° at Balmoral and some other centres.

During the *second* week no measurable quantity of rain was recorded in parts of Scotland and Wales and in the north-west of England, while it was "moderate," "light," or "very light" in other districts. At the same time it was generally colder than normal, and frost was experienced on the grass in several places, temperatures of 21° at Llangammarch Wells, 26° at Burnley, and 28° at Buxton being recorded. Although bright sunshine exceeded the average in Scotland E. and W., it was deficient ("moderate" to "scanty") generally, and the temperature was below the average.

In the *third* week bright sunshine exceeded the average in Scotland E. and W. and in England N.W. and S.W., but was elsewhere below the normal, and the temperature was more than a degree below the average in most parts of Great Britain. Frost on the grass was still in evidence, the lowest readings being 23° at Crathes and Llangammarch Wells, 25° at Birmingham, and 28° at Newton Rigg and West Linton. The weather was generally dry, and rainfall was considerably below the average in all districts, the week being quite rainless at several English stations. In Scotland E. it was "moderate" and in England E. "very light," elsewhere being "light."

A complete change characterised the *fourth* week, which was generally dull, with deficient sunshine in all districts, a temperature below the average, and an excessive rainfall, the excess being large in almost all districts—"heavy" in Scotland N. and E., and "very heavy" in all other districts.

Reports as to the condition of crops were generally unsatisfactory, and the cold "unkind" month was more favourable to the growth of weeds than to the improvement of cultivated crops. From Berkshire it

is reported that the hay crop is much under the average and much damaged by wet weather, but wheat is a good crop and coming into ear well. Roots are promising, and potatoes are turning out well. Without plenty of sunshine in July harvest is likely to be backward. Fruit of all kinds appears likely to be plentiful.

In Midlothian on July 1st the hoeing of turnips and earthing up of potatoes were being pushed forward. Potatoes are reported to be a capital crop, and free from disease. Both young and old rooks are said to be troublesome among potatoes, to which they cause damage by uprooting the tubers, which they reach by digging with their bills from the top of the ridges downwards. Oats and wheat are very satisfactory. Hay cutting had commenced on July 1st, and there appeared to be a splendid crop, particularly in districts in the vicinity of the coast. Where there is good deep soil and management has been good, the crop is long and heavy. Some four miles inland on the lighter soils the crop is light generally. There is likely to be a capital fruit crop. Cherries are a heavy crop, while gooseberries, strawberries, and red and black currants are a good deal above the average, and of fine size.

Germany.—The report of the Imperial Statistical Bureau on the state of the crops in the middle of June gives the condition of cereals as follows:—Winter wheat, 30; spring wheat, 27; winter rye, 28; spring rye, 25; barley, 25; oats, 26; and potatoes, 26 (1=very good, 2=good, 3=medium (average), 4=small).

**Notes on Crop
Prospects Abroad.**

Winter wheat is somewhat thin, and in part very weedy, while winter rye is thin and rather short in the straw. Especially early sown rye was in good condition and was partly in bloom. Despite the fact that summer grains were much retarded at the time of germination, their position at the middle of June was on the whole satisfactory, and they are expected to improve. Wheat, winter rye, and barley, however, were in a worse position than the average of the last ten years.

Potatoes were somewhat irregular and suffered here and there from night frosts, but are on the whole not unsatisfactory. In the South German States the potato crop is quite satisfactory.

Hungary.—According to the Report issued by the Hungarian Ministry of Agriculture in the middle of June, the weather in the first half of June was quite abnormal, and the heavy rains, followed by winds, were not favourable to the early growth of crops. The later rain, however, much improved the summer grains, especially wheat, which was good in the south, but in general poor compared with average years. Rust occurs sporadically. Winter wheat was generally poor, stained, and patchy, and it has been necessary to plough up a good deal. Rye, which had already begun to ripen, promised an average harvest. Of spring cereals, barley and oats were doing well. Owing to the fact that much of the winter cereal crop was bad and ploughed up, the area devoted to barley has much increased. In the case of maize the later rains made up for the earlier damage, and the maize crop was growing well.

The acreage of the principal crops is estimated as follows, as compared with the area at a similar date last year :—

	1909. Acres.	1908. Acres.
Wheat	8,139,000	8,535,000
Barley	2,842,000	2,696,000
Oats	2,726,000	2,645,000
Rye	2,642,000	2,739,000

Austria.—According to *Beerbohm's Evening Corn Trade List* (June 15th), the Austrian official crop report for June 15th states that the outlook has been improved by the recent rains. The winter-sown wheat was not expected to reach an average, whilst the rye crop was described as thin. Spring-sown wheat, however, looked very well. Barley and oats had improved, and there was reason to hope for a fairly good yield. Maize and early potatoes were described as good.

Roumania.—According to official reports published in *Dornbusch's Evening List* (June 28th), the condition of the crops has considerably improved owing to recent rains. Wheat, which is not up to the average, is likely to improve still further, as are also barley and oats. Maize particularly benefited by the rain, and the crop is considered to be almost assured.

France.—The official estimate (*Journal d'Agriculture Pratique*, June 24th) gives the area of potatoes as 3,819,500 acres, compared with 3,857,300 in 1908, the condition on June 1st being described as 35,600 acres very good, 1,322,700 acres good, 2,361,900 acres fairly good, and the remainder passable or middling.

Russia and Poland.—According to a dispatch from Mr. H. Cooke, Commercial Attaché at St. Petersburg, the official *Commercial and Industrial Gazette* of May 24th/June 6th states that the late spring and the extremely changeable nature of the weather did not then permit any very definite forecast. Winter wheat, however, was stated to be unsatisfactory in the western and in part of the Baltic Governments, and also in the more important winter wheat-growing regions in the south-east, but good in other Governments and in the North Caucasus. In general it is nearly average. The state of winter rye is described as markedly unfavourable and in general below the average. Spring grains were above the average, but the cold and rainy weather was causing anxiety, particularly in the north.

In a dispatch from Mr. C. Clive Bayley, British Consul at Warsaw, the outlook in Poland in mid-June was described as generally unsatisfactory. Winter wheat and rye have been unfavourably affected by the absence of any hot weather. Spring cereals are, however, fairly satisfactory.

A report, dated June 14th, from Mr. Consul Woodhouse, at Riga, states that the situation in the Baltic Provinces and several of the adjoining Governments was then serious. Both winter and spring cereals had made no headway, spring wheat, barley, and oats being on June 14th scarcely visible above the ground. A little rain was, however, reported to have fallen in many places, but copious showers with some warmth were needed to do any real good.

A dispatch, dated June 22nd, from Mr. C. S. Smith, Consul-General

at Odessa, states that abundant rains had fallen in Kherson, Kharkov, Poltava, and other Governments, and the prospects of the grain crops were excellent, and the outlook was good even where continued drought had previously practically destroyed hope of satisfactory crops.

Canada.—According to the report of the Census and Statistics Office on June 15th, the area under wheat is 7,750,400 acres, the increase in the three prairie provinces being 1,254,000 acres. The condition of winter wheat was 82'15, and of spring wheat 92'15 per cent. of the standard for a full crop. The area of oats is given as 9,302,600 acres, or 1,361,500 acres more than in 1908, the condition being given as 92'32. The condition of the barley crop was 91'49, and the total area 1,864,900 acres. There has been delay in farm operations in all parts of Canada, owing to the cold and wet weather in April and May. (*Dornbusch, July 8.*)

United States.—According to the Crop Reporting Board of the United States Department of Agriculture, the average condition of winter wheat on July 1st was 82'4, compared with 80'7 last month, 80'6 on July 1st, 1908, and a ten-year average of 79'6. As regards spring wheat, the average condition on July 1st was 92'7, compared with 95'2 last month, 89'4 on July 1st last year, and a ten-year average of 87'0. Oats averaged 88'3 on July 1st, a falling off of 0'4 since last month, and compared with 85'7 on July 1st of last year, and the ten-year average of 86'8. There was a very slight decline in the condition of barley, which was 90'2 on July 1st, as compared with 90'6 last month, and a ten-year average of 88'3. Rye had improved from 89'6 last month to 91'4 on July 1st, the ten-year average being 89'6. Maize was much above the average, the figures being 89'3 on July 1st, compared with 82'8 on the same date last year, and a ten-year average of 84'8. There is also an increase in the area of maize, the area planted this year, according to preliminary returns, being 109,006,000 acres, an increase of 8,010,000 acres (or 7'1 per cent.) on the area planted last year. (*Dornbusch, July 8.*)

The Board of Agriculture and Fisheries have been furnished by the Board of Trade with the following report, based upon about 210 returns from correspondents in various districts, on the demand for agricultural labour in June. Farm labourers were regularly employed during June until towards the end of the month, when there was some interruption through rain. Owing to

**Agricultural Labour
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during June.**

cold and dry weather at the commencement of the month, the crops were somewhat backward, and day labourers were not in much demand; the supply was in general quite sufficient for requirements.

Northern Counties.—Correspondents in Northumberland, Cumberland, and Westmorland report that, owing to the cold and dry weather in the early part of June, the crops were backward, and there was but little hoeing to be done. Day labourers were not in much demand, and some could not find work. In Lancashire employment was regular on the whole. The demand for day labourers was rather limited in the early part of the month, but it increased towards the end. Field work in Yorkshire was somewhat interrupted by rain during the latter part of

June, and some day labourers lost time in consequence. A correspondent in the Patrington Union writes: "Very few Irish labourers have come over as yet except those who have regular places to go to."

Midland Counties.—Agricultural employment in Cheshire and Derbyshire was fairly regular, but hay-making was delayed by rain at the end of the month. Similar reports come from Nottingham and Leicestershire. In Staffordshire and Shropshire some day labourers were only partially employed at the end of June, owing to wet weather. The supply of such men was a little in excess of the demand in most districts. Hoeing corn, carting manure, and other work afforded regular employment in Worcestershire until towards the end of the month, when stormy weather caused some loss of time. A scarcity of men for permanent situations is reported in the Evesham Union. Reports from Warwickshire state that rain interrupted outdoor work in the latter part of June, and employment was more irregular than in the previous month. A demand for men for permanent situations was reported in the Lutterworth Union. The regular farm labourers in Northamptonshire were in constant employment during June, but some day labourers employed in hoeing lost time owing to heavy rain, which also delayed the hay-making. The supply of such men was in general just about sufficient for requirements. Similar reports come from Oxfordshire and Buckinghamshire. In Hertfordshire and Bedfordshire, where hay-making had commenced in some districts, outdoor work was interrupted by wet weather at the end of the month, and day labourers were consequently not in much demand.

Eastern Counties.—Day labourers in Huntingdonshire and Cambridge-shire were somewhat irregularly employed, and in some districts the supply was in excess of the demand. In Lincolnshire employment was regular till towards the end of June, when rain caused outdoor work to fall in arrear, owing to the sodden state of the land. A demand for youths as yearly servants was reported from the Lincoln Union. In Norfolk there were several wet days on which turnip hoeing and hay-making could not be carried on. The supply of day labourers was about equal to the demand in most districts. Reports from Suffolk and Essex state that some day labourers lost time through rain, which stopped the early haymaking and prevented hoeing. The supply of day labourers was, on the whole, somewhat in excess of requirements.

Southern and South-Western Counties.—In Kent some irregularity of employment was caused by wet weather, and many day labourers lost time. There was a moderate demand for such labour, but the supply was generally in excess. Outdoor work in Surrey and Sussex was interrupted by cold and wet weather, which caused several day labourers to be unemployed, and stopped the early haymaking in districts where it had commenced. Reports from Hampshire and Berkshire state that wet weather greatly interfered with hoeing and haymaking. The supply of day labourers was generally in excess of the demand. In Wiltshire and Dorset there was some irregularity of employment through the stormy weather. The supply of day labourers in these counties was generally sufficient. Agricultural employment in Somerset was fairly regular. A scarcity of men for permanent situations is mentioned in the Taunton Union. Day labourers in Herefordshire, were not in much

demand, owing to the slow growth of the root crops and the late hay-making. Outdoor work in Gloucestershire was somewhat interrupted by rain, and day labourers lost time in consequence. The supply of this class of labour was about equal to the demand. Hoeing the root crops, preparing land for turnips, and the commencement of the hay harvest afforded plentiful employment in Devon and Cornwall, but there was some little interruption by rain towards the end of the month.

THE CORN MARKETS IN JUNE.

C. KAINS-JACKSON.

The remarkable stability of wheat values throughout June was the principal fact of the month's trade in breadstuffs. The advance of prices to what on an average of all wheat sold might work out at about 45s. per qr. was accomplished earlier in the season. There were then those who believed that, with exhausted home reserves, 50s. would be reached, while a large number of traders took the more conventional view of expecting a reaction. But there has been no reaction and there has been little further advance. The rise accomplished has served to attract sufficient supplies, but it has not brought forth more grain than the market requires.

The spring corn trade has concentrated itself mainly upon maize, the arrivals of which from Argentina have been adequate but by no means overwhelming. With considerable spot arrivals to pass into distribution some price concessions to buyers for cash have taken place, but by the middle of the month value had found a natural level, and, this once established, a steady business passed with markets closing decidedly firm.

Wheat.—Owing to supplies at the statute markets being much smaller than usual in June, the country exchanges have advanced about a shilling on the May average. London has remained about where it was so far as the mean value of English wheat goes. The best "white fluffs" from East Kent have made 47s. per 504 lb. at Mark Lane, while sound Red Wheat from Norfolk has made 45s. to 46s. for a like good weight. Essex Rivetts, a lighter weight and a separate variety of wheat, have been obtainable at 43s. to 44s. per qr. At the end of the month the extreme scarcity of old wheat caused some very high prices to be asked locally.

Foreign wheat has arrived in fair quantity, but the period of the year being one when English wheat is always scarce, liberal receipts at the ports are looked forward to without apprehension. As a matter of fact, in no week of June did the total market supply of British and foreign wheat and flour equal estimated requirements, and the stocks in granary have fallen from a month ago. The exact figures of receipts are not yet fully verified, while sales of British wheat outside the statute markets have always to be estimated. At the same time a liberal allowance will not put the average daily supply of breadstuffs during June at more than 75,000 qrs., whereas nearly all estimates of the national requirements put them at not less than 90,000 qrs. daily. These figures point to some rise of prices in July as probable; indeed, Mark Lane, on the very last day of

June, saw certain advances demanded and in some cases made. La Plata wheat, worth 45s. 6d. on the 2nd of the month, was sold at 46s. 6d. at the market of the 30th. Russian wheat, beginning the month with a 45s. to 46s. range, ended at the same price; but Manitoba, which started with 47s. paid for No. 1, 46s. for No. 2, and 45s. for No. 3, closed with no sellers of these three grades under 48s. 6d., 48s., and 47s. 6d. per qr. Values will be seen to have closed up, there being a relative scarcity of the grades below the first. Telegrams to the Manitoba elevators asking for July shipments had during the three last days of June received answers in the negative, and thus the closing feeling for Dominion wheat in London was of decided stringency. June shipments of wheat from North America were 555,000 qrs., or about half the total for June, 1908. Canada did rather more business than usual, so that the falling off in shipments from the United States was very large indeed. The price of new winter wheat at New York fell from 43s. in the middle of the month, when it first came on sale in appreciable quantity, to 41s. at the close. This reduction makes a larger export business possible, and the price for September shipment, 39s., may almost be said to promise a considerable trade. South America shipped 878,000 qrs., which is less than for the four Junes immediately preceding. It is not, however, an unimportant contribution. Russia has shipped 1,873,000 qrs., which represents the heaviest exportation since 1906. The Russian wheat crop of 1908 appears to have been underestimated. India shipped 929,000 qrs. This is a rather heavy total, but June is usually the period when Indian exports are at full flow. Australia shipped 85,000 qrs. There were on the last day of June 3,100,000 qrs. on passage, as compared with 2,878,000 qrs. on passage on the last day of May.

Flour.—There have been no changes in flour prices for two months, and in consequence the price of bread has remained steady. The London makes "Top-price," "Town Whites," and "Town Households" remain respectively at 39s., 37s., and 34s. per sack. As the usual difference is 3s. between the first and second type, it will be seen that Top-price is, relatively speaking, a good bargain. Owing to the shutting-down of many country mills, bran, pollard, and middlings are more difficult to procure, and the prices averaged are about 1s. 3d. per ton higher. Hungarian has risen to the all but unprecedented price of 52s. per sack, and at this quotation there are naturally next to no buyers. The American shipments of flour for June were only 315,000 sacks, and the supply on British markets has not fully attained to bakers' requirements. Prices accordingly closed a little higher than they opened. There are now 204,000 sacks on passage, which is 48,000 sacks' increase on the month, but still 46,000 sacks below the average.

Barley.—The decline in June in the average price of British barley merely indicates a reduced proportion, normal to the time of year, of malting grade tendered at the statute markets. Quality for quality no decline on the month is to be noted. The Russian barley, which dominates the market for imported kinds, is still on offer at 22s. 6d. per 400 lb. Here and there a sample of Californian Brewing comes on sale at 34s. per 448 lb., and among the rare but not absolutely absent tenders on Mark Lane may be noted Chilian Chevallier at 39s. per

448 lb., Anatolian at 34s. per 448 lb., and Persian at 19s. per 400 lb. June shipments were 1,240,000 qrs. from Russia, 97,000 qrs. from Roumania, and 31,000 qrs. from the United States.

Oats.—The average value of British oats at the statute markets shows a rise of nearly a shilling on the month. The rise is usual for the time of year, and no cereal pays for holding with so near an approach to certitude on a series of years. No feeding stuff has a better or more constant "quality" market, and growers find that quite ordinary oats, kept over the winter and spring and conditioned by time and care, will fetch on an average season fully 3s. advance from November to June. The expediency of holding is therefore an established fact, not of one season in this trade, but of an average of many years. Foreign oats are 6d. dearer on the month, and 18s. 6d. is paid with readiness for 304 lb. samples, which later May saw hard to place at 18s. per qr. Shipments for June were 238,000 qrs. from Argentina and 798,000 qrs. from Russia.

Maize.—Shipments of this cereal from Argentina in June amounted to 1,726,000 qrs., compared with 911,000 qrs. in the corresponding month of 1908. America shipped 14,000 qrs. only, as compared with 8,000 qrs. in June, 1908, but 800,000 qrs. in June, 1907. The prices which were made for maize at the end of June were 29s. for flat corn (American), 27s. for round (Russian), and 26s. 9d. for yellow (Argentine). The demand for the last-named has proved fully equal to the arrivals and the market is firmer. On the other hand, America is now offering to ship new crop maize in January next at 24s. per qr., including freight and insurance to London.

Pulse.—Soy beans from Manchuria (Dalny) have arrived to the extent of some 20,000 qrs. in London, and have gone promptly into sale at 7s. per cwt.; 7s. 3d. is now demanded. Other sales of pulse at the end of June included Maple peas at 40s., Dun at 36s., new beans at 39s., old at 41s., millet at 26s. (for feeding purposes), and sorghum at about the same price.

Oil Seeds.—The prices asked at the end of June were 45s. to 47s. per 410 lb. for Indian linseed, 44s. to 45s. per 416 lb. for Argentine linseed, and 58s. to 64s. per 424 lb. for English rapeseed. Cotton-seed made 8s. per cwt. for comparatively retail transactions, but good Egyptian could be procured at £7 15s. per ton by wholesale purchasers.

Farm Seeds.—Canary seed has advanced 2s. per qr. on the month, mainly in consequence of the short yield of the new crop in Turkey. At the end of June, 50s. per 464 lb. was paid for Turkish, though 46s. commanded good samples of Argentine. Other sales of farm seeds included English red clover-seed at 62s. per cwt. for best, and French lucerne at 77s. per cwt. for fair average quality.

Minor Staples.—Rye has remained firm at 30s. per 400 lb. Dari is dear for "bold" or large-grain types, 35s. being paid for Smyrna. Small dari from India is offered at 27s. Buckwheat has been in steady request at 26s. to 28s. per 416 lb. It is largely used for pheasant feeding, but is growing in appreciation among those who keep domestic fowls.

THE LIVE AND DEAD MEAT TRADE IN JUNE.

A. T. MATTHEWS.

Fat Cattle.—The month opened with a good demand, and at 17 markets held in the first three days first quality Shorthorns averaged 8s. 3d. per stone, which was a fractional advance on the latest May quotation. During the week which followed there was a more decided upward tendency, for no fewer than 13 out of 26 markets reported higher prices, while the remainder were firm with a good demand, these reports referring to cattle of any breed and not to Shorthorns only. Supplies continued good, and, with a few exceptions, the quality was excellent for the time of year. Usually at this season there occurs a sudden falling off in the supply of house-fed cattle, their places being taken by immature animals from the grass. Confining the report to Shorthorns, the average value at 22 markets went up to 8s. 5d. per stone for first quality and 7s. 8d. for second. The London price was 8s. 5d., but five markets quoted 8s. 9d. These were Ashford, Basingstoke, Newcastle, Newport, and Preston. The lowest were Dorchester, Ipswich and Norwich, the range between highest and lowest being no less than 9d. per stone. Best quality Herefords at Hereford, Salford, Shrewsbury, and Wellington (Salop) were uniformly quoted at 8s. 9d., or 7½d. per lb. Devons averaged 8s. 4d. at four markets, and Polled Scots 8s. 8d. at five English markets.

The next week a similar state of things prevailed with regard to the supplies, and grass-fed bullocks were present at many markets with very good apparent finish. These must have been in very forward condition on going to pasture, but some complaint was made of their weighing badly after slaughter. Trade was very steady during the week ending on the 17th, the average price of Shorthorns showing a further slight advance, it being 8s. 6d. at 23 markets for first and 7s. 8d. for second quality, London, Ashford, Basingstoke, Bristol, and Newcastle reaching the highest quotation at 8s. 9d. per stone, the lowest of the week being Dorchester at 8s. 2d. Best Herefords the same week were quoted at four markets at an average of 8s. 8d., Devons at six markets at 8s. 7d., and Polled Scots at seven English markets at 8s. 9d.

The markets during the week ending on the 24th showed a considerable falling off in the proportion of stall-feds, although at Islington on the Monday there was still a very good supply from Norfolk. Smaller intrinsic value from this cause would more than account for the slight average decline at 22 markets of about 1d. per 14 lb. At Ashford, Basingstoke, and Newcastle the maximum of 8s. 9d. for Shorthorns was maintained, and only at Shrewsbury and Peterborough did first quality fall below 8s., the general average being 8s. 4d. It is not often that Aberdeen-Angus bullocks, direct from Scotland, are offered at Islington except at Christmas, when there is always a good show. Those representing this breed at ordinary times are chiefly bred in Ireland and fed in Norfolk, and have to be quoted as second quality. On the 21st, however, there was a consignment of 40 from Aberdeenshire, and these were quickly secured at 8d. per lb. or 9s. 4d. per stone. The trade for fat cows was also very good in London, and on the same day one salesman sold

several at £21 per head. There was no weakness displayed in the cattle trade during the closing days of the month. At Norwich on the 26th there was a shorter supply and a very firm trade at a rather sharp advance of about 6d. per stone, while at Islington on the 28th Norfolk stall-feds were few, and the grass-fed Herefords were the chief feature of the market. Many of these showed some want of finish, but they realised up to 7½d. per lb. for the best, and the choicest Norfolks up to 7½d. One nice lot of six of the latter were sold at £25 each, and when weighed after sale were found to have realised 41s. 4d. per live cwt.

The net result of the country's trade in fat cattle during June may be safely estimated at an advance in values of about 2d. per 14 lb. stone, while at Islington prices were almost the same as last year at the corresponding period.

Fat Calves.—There was a moderately good demand for veal calves throughout the month, and the average price varied but little from week to week. Taking the week ending on the 10th, the price of first quality averaged 8½d. per lb. at 26 markets in Great Britain. The only place where 9d. was exceeded was Wellington (Salop), the best making 9½d., while the highest price at Norwich was only 7d. Later in the month the average slightly declined, being only 8½d. for the week ending the 24th, Dorchester being the lowest at 7½d., while at Norwich the price was 8d. per lb.

Fat Sheep.—Reports of the sheep trade were of a gloomy character nearly all the month, and after the rally which had recently taken place and given rise to hopes of lasting improvement, the disappointment was keenly felt. Accounts of so many markets failing to clear and the want of life in the trade gave, however, a rather exaggerated idea of the actual decline in values, and when the reports were more carefully examined they failed to show any serious reduction from the prices prevailing in May. Still, when the figures are compared with those of corresponding dates in 1908, we find that they are about ½d. per lb. below those then current in the Metropolitan market. The average price of Downs in 15 markets held during the first three days was 7½d. per lb. for first quality. In the course of the following week the trade was certainly weaker, especially for heavy weights and second quality sheep. Yet the average of the top quotations in 17 markets for prime small Downs was no lower, being still a fraction over 7½d. per lb. for first, and nearly 7d. for second quality. Best small Longwools in the 16 markets quoted averaged 7d. per lb., and at Newcastle Longwools were quoted at the relatively high figure of 8d. against 6½d. at Lincoln and Peterborough. The explanation of this great discrepancy must be in the superior breed of sheep classed as "Longwools" at Newcastle, they being, presumably, chiefly Border Leicesters. The following week no less than 26 out of 37 markets were described as being worse for fat sheep, and no doubt trade was very slow and heavy sheep very difficult to cash, yet the records showed a very small, if any, reduction on either class of sheep. The course of trade in the week ending on the 24th may be described in the same words, values, on the average, being extremely little changed, except, perhaps, at Norwich, where "Downs" declined ½d. per lb., and at Leicester, where a fall of ½d. was reported. At the last Monday's

market at Islington there were fewer sheep on offer by about 1,000, and butchers seemed more inclined to buy at first, but later trade again relapsed and there was no real improvement in prices, which remained much as they were four weeks before, viz., with prime Downs fetching 7½d. and Longwools 6½d.

Fat Lambs.—Lambs appear to have been rather freely marketed during the month, and with their increased size and weight their value per lb. would naturally fall. Large numbers were, in fact, sold at about the same price as small tegs and passed into consumption as such. Towards the end of the month a number of forward Hampshire Down lambs were shorn and sold at Islington as tegs at 7½d. per lb. Up to the 10th, prime small lambs averaged 10½d. per lb. in 39 British markets and 9½d. for second quality. In three Scotch markets 1s. per lb. was reached, but 11d. was the highest quotation in any English market. The following week there was a considerable fall, owing to larger supplies, and the average for prime small lambs not exceeding, say, 40 lb., was only 9½d. per lb., this price being about maintained to the end of the month. At Islington on the 28th the top price was 9d.

Fat Pigs.—The trade in fat pigs remained exceedingly firm, and was doubtless strengthened by the remarkably cool weather which prevailed throughout the month. During the first half of June the average price of small bacon pigs was 7s. 1d., and 6s. 5d. per stone for second quality or large pigs. Later there was a very slight average decline, but the price still stood well over 6d. per lb. for prime quality, and at Birmingham they were quoted at 11s. 3d. per score.

Carcass Beef.—Scotch and English beef at the London Central Market remained unchanged on the 2nd from the values current the last week in May, but were moving upwards by the 9th. Scotch short sides sold at 7½d., and in extreme cases at 7½d., per lb., while long sides were fetching 6½d. and English 5½d. Port killed was then steady at about the same price as English, and American chilled hind quarters were worth from 5½d. to 6½d. Argentine chilled, however, advanced suddenly by no less than ½d. per lb., and was fetching 5½d. per lb. for best hind quarters. Another striking feature was the advance in frozen, which amounted to ½d. per lb. since the end of May, hind quarters being worth 4½d. per lb. At the corresponding period last year the very best New Zealand was only making 3½d. The alleged reason for this advance was "scarcity." The following week Scotch was firm and English ½d. dearer. Deptford killed advanced ½d., but Argentine chilled met with a temporary check, falling ½d. per lb. Frozen was also a trifle easier on the week.

On the 23rd, home killed was stationary in values, except that Scotch long sides were ½d. dearer, Deptford and Birkenhead killed going up another ½d. per lb. Deptford killed then touched 6½d. per lb. American chilled hind quarters advanced ½d., and Argentine regained the ground lost the previous week. As the month closed in, these prices were still further advanced, and latest reports state that Argentine beef has been sold as high as 6½d. per lb. The most striking features of the carcass-beef trade were the near approach of the value of port killed to that of the finest Scotch, and the relatively high price of frozen.

Carcass Mutton.—Fresh killed mutton fairly maintained the prices

of May for the first half of the month, fine small Scotch making 8d. per lb. and wethers 7½d. West Country English were worth 6½d. to 7d. Then came considerable arrivals of Dutch, and this, combined with the depression in the live market, caused a sharp fall, and the end of the third week saw Scotch quoted at 7½d. and English at 6½d. as the top prices. The last days of June saw a little better inquiry and a partial recovery of rates. The quotations for Dutch were nearly as high as those for the best English.

Carcass Lamb.—The trade in lamb was quiet throughout, the market being very fully supplied and the best frozen colonial obtainable at 5d. per lb. Still, small English lamb fetched 9d. per lb. during the first ten days of the month, after which prices gave way, and by the 16th the best was only fetching 8½d., and on the 23rd the demand was so sluggish that 8d. was quite the top price.

Veal.—The volume of trade in British veal in London is always very small, and prices are comparatively low, owing to the severe competition of Holland, from which country excellent quality veal is sent regularly in large quantities. Consequently the large centres in the north of England are almost always much better markets than London for English veal. Prices at Smithfield varied during June from 6½d. to 7½d. per lb. for prime quality.

Pork.—There was practically no change in the value of pork, which ruled from 6½d. to 6½d. per lb. for prime small pigs in London, Liverpool, and Manchester, and perhaps slightly more in Birmingham.

THE PROVISION TRADE IN JUNE.

HEDLEY STEVENS.

Bacon.—The consumptive demand during the entire month has been most disappointing, caused chiefly by the wet and unseasonable weather, as well as the prevailing extremely high prices which are curtailing the consumption.

London dealers and others report that directly they advanced their retail price to 1s. 2d. per lb. for best smoked bacon, the demand was immediately checked. This caused some reaction in prices, more especially for Danish, say from 4s. to 5s. per cwt. Killings in Denmark have not been large, but arrivals from Holland have been a little heavier.

Canadian bacon, although continuing to arrive in very small quantities, also suffered from the meagre demand, and at one time during the month showed a drop of 2s. to 4s. per cwt. Canadian packers report that the prices of hogs are still very high, and, although the prices being realised in this country are relatively high, they continue to make losses. Quotations for dressed hogs are from \$12.00 to \$12.25, as against \$9.50 to \$9.75 at the same time last year.

The shipments from the United States show a further falling off, but the demand is so much smaller that the arrivals have been more than sufficient to fill all requirements. The cold weather has considerably curtailed the consumption of hams, and stocks in England are said to

be accumulating. However, present shipping rates are several shillings over spot values, so that very few are now being shipped, and directly we experience some warm weather present stocks will be quickly used up.

In America hogs have been marketed in less numbers during the month, and prices have touched as high as \$8.15 (the average price for that week being the highest since 1896), against the top price of \$6.50 during June, 1908, and \$6.10 during June, 1907.

The scarcity of English pigs becomes more accentuated; some of the leading home curers cannot keep their factories fully running, necessitating the discharge of some of their workmen at a time of year when they should be fully occupied.

Cheese.—The consumption for the month has been very disappointing, and most of the merchants still hold some stock of last season's Canadian and English. Arrivals of new makes have been quite up to the average, but, on account of the high cost, sales at a profit have been difficult. The quality has been only fair.

Canadian cables ask high prices for June makes, say about the same as those ruling at the same time last year, but importers are operating sparingly, feeling that prices are too high, and that with a fair make in progress we must have a lower range of prices in the near future. The receipts into Montreal from May 1st to June 12th total 208,788 cheese, against 211,557 for the same period last year.

New Zealand cheese has arrived in large quantities during the month. One week the imports of cheese from all parts show an increase of nearly 20,000 cwts., and most of this increase would be made up with New Zealand's.

There is a large make of English cheese in progress; it is estimated to be fully equal to last year's, the unseasonable weather having curtailed the consumption of milk, so that increased quantities have been available for cheese and butter manufacture.

The estimated stocks of Canadian and States cheese at the three principal distributing centres (London, Liverpool, and Bristol) at the end of the month were 104,000, against 99,000 at the same time last year, and 129,000 two years previously.

Butter.—There has been a steady trade in butter throughout the month, with prices a little higher during the early part, but they eased off later. Arrivals have been fair, but less than during June, 1908. The make in Ireland has been quite up to the average, but the shipping trade has been hampered by the labour strike. There is a large make going on in Siberia, but Germany appears to be taking their excess quantity.

In Canada the make of butter is a little larger than last year, as the following receipts into Montreal prove:—May 1st to June 12th, 1909, 60,633 packages, against 56,039 packages for the same period last year, but prices are still above an export basis.

Eggs.—Eggs have again experienced a satisfactory month's trade, at prices above those current at the same time last year. By the end of the month there was an appreciable falling off in the demand, which is usual when fruit becomes more plentiful.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and SCOTLAND
in the Month of June, 1909.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	ENGLAND.		SCOTLAND.	
	First Quality.	Second Quality.	First Quality.	Second Quality.
FAT STOCK:—	per stone.*	per stone.*	per cwt.†	per cwt.†
Cattle:—	s. d.	s. d.	s. d.	s. d.
Polled Scots	8 8	8 2	40 8	37 5
Herefords	8 7	7 10	—	—
Shorthorns	8 4	7 7	39 7	36 8
Devons	8 6	7 10	—	—
	per lb.*	per lb.*	per lb.*	per lb.*
	d.	d.	d.	d.
Veal Calves	8½	7½	8½	7
Sheep:—				
Downs	7½	6½	—	—
Longwools	7	6½	—	—
Cheviots	8½	7½	8½	7½
Blackfaced	8	7½	8	6½
Cross-breds	7½	6½	8½	7½
	per stone.*	per stone.*	per stone.*	per stone.*
	s. d.	s. d.	s. d.	s. d.
Pigs:—				
Bacon Pigs	7 2	6 7	6 10	6 0
Porkers	7 6	7 0	7 4	6 5
LEAN STOCK:—	per head.	per head.	per head.	per head.
Milking Cows:—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk ...	20 17	17 9	21 16	17 9
„ —Calvers... ..	20 8	17 7	19 10	17 0
Other Breeds—In Milk ...	19 0	14 17	18 0	15 18
„ —Calvers	—	—	18 17	15 16
Calves for Rearing	2 6	1 15	2 14	1 19
Store Cattle:—				
Shorthorns—Yearlings ...	9 19	8 11	9 19	8 12
„ —Two-year-olds ..	14 3	12 3	15 0	12 8
„ —Three-year-olds ...	17 2	15 4	17 0	14 5
Polled Scots—Two-year-olds	—	—	16 0	13 14
Herefords—	15 7	14 3	—	—
Devons—	14 10	12 18	—	—
Store Sheep:—				
Hoggs, Hoggets, Tegs, and Lambs—	s. d.	s. d.	s. d.	s. d.
Downs or Longwools ...	36 5	32 7	—	—
Scotch Cross-breds ...	—	—	34 1	28 1
Store Pigs:—				
Under 4 months	25 11	19 10	25 3	20 5

* Estimated carcase weight.

† Live weight.

AVERAGE PRICES of DEAD MEAT at certain MARKETS in
ENGLAND and SCOTLAND in the Month of June, 1909.

(Compiled from Reports received from the Board's Market
Reporters.)

Description.	Quality.	London.	Birming- ham.	Man- chester.	Liver- pool.	Glas- gow.	Edin- burgh.
		per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
BEEF :—							
English	1st	55 0	56 6	56 0	—	60 0*	58 6*
	2nd	53 6	53 0	53 6	—	56 0*	54 0*
Cow and Bull ..	1st	43 0	49 6	49 6	45 0	47 0	46 6
	2nd	36 6	42 6	45 0	38 6	40 0	40 0
U.S.A. and Cana- dian :—							
Port Killed ...	1st	57 0	54 6	53 6	53 6	57 0	55 6
	2nd	53 6	50 0	50 6	49 6	53 0	46 6
Argentine Frozen—							
Hind Quarters...	1st	40 6	40 6	40 0	40 0	36 6	40 0
Fore „ „	1st	27 0	28 6	27 0	27 0	26 0	27 6
Argentine Chilled—							
Hind Quarters ..	1st	48 6	49 0	47 0	46 6	49 6	49 0
Fore „ „	1st	30 0	30 6	29 6	29 0	32 6	31 0
American Chilled—							
Hind Quarters—	1st	59 6	61 0	60 6	60 6	—	62 6
Fore „ „	1st	37 0	38 6	37 6	37 6	—	39 0
VEAL :—							
British	1st	64 6	65 6	70 0	74 6	—	—
	2nd	60 0	58 6	65 6	65 6	—	—
Foreign	1st	64 0	—	—	—	—	63 6
MUTTON :—							
Scotch	1st	73 0	—	71 6	73 0	76 0	72 0
	2nd	67 6	—	66 6	67 6	62 0	57 0
English	1st	63 0	64 0	67 6	68 0	—	—
	2nd	59 0	58 6	63 0	63 6	—	—
U S.A. and Cana- dian—							
Port killed ...	1st	—	—	—	—	—	—
Argentine Frozen ...	1st	26 0	25 6	25 6	25 0	24 6	25 6
Australian „ „	1st	22 6	24 0	23 6	22 6	24 6	—
New Zealand „ „	1st	33 0	—	—	—	—	—
LAMB :—							
British	1st	80 6	77 6	77 6	77 0	93 6	83 0
	2nd	72 6	72 6	73 0	69 6	72 6	77 0
New Zealand ...	1st	46 6	48 0	46 0	46 0	49 0	51 6
Australian	1st	36 6	37 6	35 0	35 0	35 6	—
Argentine	1st	38 6	37 6	35 0	35 0	34 6	40 0
PORK :—							
British	1st	60 0	63 0	60 0	58 6	60 0	56 6
	2nd	55 0	59 0	56 0	53 6	57 6	50 0
Foreign	1st	59 0	56 0	57 0	57 0	—	49 0

* Scotch.

AVERAGE PRICES of **British Corn** per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1907, 1908 and 1909.

Weeks ended (in 1909)	WHEAT						BARLEY						OATS.					
	1907		1908		1909		1907		1908		1909		1907		1908		1909	
	s	d	s	d	s	d	s	d	s	d	s	d	s	d	s	d	s	d
Jan 2	26	0	35	1	32	0	23	11	26	9	26	7	17	3	18	4	17	4
" 9	26	1	35	2	32	9	24	2	26	9	26	11	17	4	18	3	17	5
" 16	26	1	35	5	32	8	24	1	27	1	27	1	17	5	18	5	17	5
" 23	26	2	35	6	33	2	24	5	26	11	27	3	17	5	18	5	17	8
" 30	26	3	35	0	33	0	24	4	26	11	27	6	17	5	18	4	17	9
Feb 6	26	6	34	3	33	4	24	5	26	9	27	7	17	7	18	3	17	10
" 13	26	7	33	1	33	8	24	1	26	9	27	8	17	7	18	0	17	11
" 20	26	10	32	6	34	1	24	2	26	5	27	11	17	9	17	11	18	0
" 27	26	9	30	11	34	5	24	2	26	3	28	0	17	9	17	8	18	0
Mar 6	26	8	30	5	34	10	23	11	26	1	27	11	17	11	17	8	18	2
" 13	26	10	31	3	35	8	24	2	26	0	28	4	18	0	17	10	18	2
" 20	26	10	31	7	35	9	24	0	26	2	28	0	18	1	17	11	18	5
" 27	26	8	31	4	36	0	23	9	25	10	28	0	18	2	17	10	18	6
Apl 3	26	9	31	3	36	5	24	3	25	5	27	10	18	3	17	9	18	8
" 10	26	8	31	2	37	4	23	9	25	10	28	0	18	6	17	7	18	10
" 17	26	8	30	11	38	7	23	3	26	1	27	8	18	7	17	7	19	2
" 24	26	10	30	10	41	4	23	3	25	5	28	2	18	9	17	9	19	9
May 1	27	0	31	6	42	5	23	6	25	8	27	10	19	3	18	0	20	0
" 8	27	6	32	4	40	9	24	0	25	5	27	7	19	7	18	4	20	3
" 15	28	4	33	1	41	6	23	10	24	9	27	3	20	1	18	7	20	6
" 22	29	7	33	8	42	8	24	3	25	9	27	0	20	5	18	10	20	11
" 29	31	4	33	5	42	6	24	0	24	6	26	3	20	8	18	8	21	0
June 5	32	0	33	1	43	1	24	7	25	10	25	7	20	7	18	4	21	3
" 12	31	10	32	7	42	11	24	7	24	5	26	10	20	11	18	4	21	4
" 19	31	4	32	0	42	7	24	11	24	2	26	10	20	9	18	5	21	6
" 26	31	2	31	5	42	8	24	6	24	0	27	2	20	8	18	7	21	7
July 3	31	3	30	11	42	9	24	8	23	11	27	2	20	11	18	7	21	9
" 10	32	0	30	5			24	10	24	4			20	11	18	5		
" 17	32	6	30	7			24	6	23	1			21	1	18	5		
" 24	32	11	31	5			27	3	26	5			20	8	18	6		
" 31	33	2	31	10			26	4	24	4			21	2	18	7		
Aug 7	33	5	31	6			26	6	23	1			21	3	18	9		
" 14	33	6	31	6			25	9	23	10			20	4	18	1		
" 21	33	7	31	2			25	0	24	5			19	8	17	10		
" 28	33	10	30	10			24	6	24	5			18	11	17	1		
Sept 4	31	11	30	10			24	2	25	5			17	7	17	3		
" 11	31	4	31	5			24	4	25	11			17	6	17	6		
" 18	31	5	31	7			25	0	26	0			17	6	17	3		
" 25	31	8	31	5			25	3	26	8			17	8	17	2		
Oct 2	32	6	31	7			25	5	26	11			17	9	17	2		
" 9	33	3	31	5			25	9	27	5			17	11	17	0		
" 16	34	4	31	2			26	3	27	6			18	0	17	0		
" 23	35	9	30	11			27	2	27	5			18	7	16	11		
" 30	36	3	30	8			27	7	27	5			18	10	16	11		
Nov 6	35	10	30	11			27	8	27	6			18	10	17	0		
" 13	35	1	31	2			27	8	27	4			18	8	17	0		
" 20	34	7	31	10			27	5	27	3			18	9	17	3		
" 27	34	7	32	3			27	5	27	2			18	7	17	5		
Dec 4	34	7	32	7			27	1	27	2			18	6	17	4		
" 11	34	8	32	8			27	0	27	0			18	5	17	4		
" 18	34	9	32	9			27	1	26	0			18	3	17	3		
" 25	34	6	32	2			26	10	26	8			18	0	17	2		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lbs., Barley, 50 lbs., Oats, 52 lbs. per Imperial Bushel.

AVERAGE PRICES of Wheat, Barley, and Oats per Imperial Quarter in FRANCE, BELGIUM, and GERMANY, and at PARIS, BERLIN, and BRESLAU.

		WHEAT.		BARLEY.		OATS.	
		1908.	1909.	1908.	1909.	1908.	1909.
		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
France :	May	38 8	42 5	25 11	27 4	19 9	23 4
	June	37 9	44 6	25 6	28 5	19 8	24 9
Paris :	May	38 5	45 4	26 2	23 3	19 3	24 0
	June	38 6	46 7	26 2	25 5	19 3	27 2
Belgium :	April	33 8	40 6	26 5	26 8	20 9	22 4
	May	35 5	42 5	26 5	26 10	21 3	23 3
Germany :	April	44 4	50 3	28 6	31 7	21 10	25 1
	May	46 0	—	27 7	—	22 7	—
Berlin :	April	44 8	51 11	—	—	22 4	25 0
	May	47 3	55 6	—	—	22 10	25 5
Breslau :	April	42 8	47 11	28 6	32 6	20 1	23 8
				(brewing)	(brewing)		
				26 5	26 0		
				(other)	(other)		
	May	44 4	51 6	28 6	32 6	20 9	25 3
				(brewing)	(brewing)		
				25 11	26 0		
				(other)	(other)		

NOTE.—The prices of grain in France have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*; the Belgian quotations are the official monthly averages published in the *Moniteur Belge*; the German quotations are taken from the *Deutscher Reichsanzeiger*, the prices for the German Empire representing the average of the prices at a number of markets.

AVERAGE PRICES of British Wheat, Barley, and Oats at certain Markets during the Month of June, 1908 and 1909.

		WHEAT.		BARLEY.		OATS.	
		1908.	1909.	1908.	1909.	1908.	1909.
		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
London...	...	33 0	42 10	26 8	27 5	19 5	21 9
Norwich	..	31 10	42 9	25 7	26 10	18 4	20 10
Peterborough	...	31 1	41 5	24 9	—	17 10	21 0
Lincoln...	..	31 9	42 1	24 10	—	17 9	21 6
Doncaster	...	31 7	42 1	24 4	26 1	18 4	21 4
Salisbury	...	32 0	43 3	—	24 9	17 11	21 1

AVERAGE PRICES of PROVISIONS, POTATOES, and HAY at certain MARKETS in ENGLAND and SCOTLAND in the Month of June, 1909.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	London.		Bristol.		Liverpool.		Glasgow.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
BUTTER :—	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British ..	12 9	11 6	14 0	12 6	—	—	14 0	—
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery	107 0	104 6	108 6	106 6	102 0	99 0	103 6	98 6
„ Factory	100 0	96 0	98 0	94 0	93 6	89 6	—	—
Danish ..	111 6	109 0	—	—	112 0	109 6	112 6	—
Russian ..	101 6	98 6	104 6	95 0	102 0	98 0	101 6	97 6
Australian ..	100 0	98 0	104 6	97 6	—	—	104 0	98 0
New Zealand	105 6	103 6	108 0	105 6	—	—	106 0	—
Argentine ...	102 0	98 0	107 6	103 0	102 0	99 0	—	—
CHEESE :—								
British—								
Cheddar ...	84 0	68 0	78 0	71 6	75 0	71 0	61 6	58 6
	120 lb.	120 lb.	—	—	120 lb.	120 lb.	—	—
Cheshire ..	68 6	60 0	—	—	65 6	60 0	—	—
	per cwt.	per cwt.	—	—	per cwt.	per cwt.	—	—
Canadian ...	61 6	60 0	64 0	62 6	60 6	59 0	59 6	58 0
BACON :—								
Irish ...	73 0	69 6	75 6	70 6	73 6	69 6	72 6	68 6
Canadian ...	66 6	66 0	67 0	66 0	65 6	63 6	67 0	65 6
HAMS :—								
Cumberland ...	104 0	90 0	—	—	—	—	—	—
Irish ...	101 0	91 6	—	—	—	—	100 0	92 0
American								
(long cut) ...	60 0	59 0	60 0	57 0	62 6	59 0	64 0	62 0
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British ...	10 10	9 9	9 4	8 11	—	—	—	—
Irish ...	9 4	8 7	8 10	8 4	9 5	8 3	8 7	7 3
Danish ...	9 11	8 7	—	—	8 11	8 8	8 11	7 6
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Langworthy ...	60 0	49 6	62 6	57 6	80 0	71 6	52 6	47 6
Scottish								
Triumph ...	52 6	46 0	60 0	55 0	41 6	36 6	—	—
Up-to-Date ..	53 6	45 0	65 0	60 0	41 6	36 6	36 0	31 0
HAY :—								
Clover ...	78 0	62 0	72 6	—	87 0	65 0	76 0	71 0
Meadow ...	68 0	53 0	65 0	—	—	—	60 0	57 6

DISEASES OF ANIMALS ACTS, 1894 to 1903.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

DISEASE.	JUNE.		SIX MONTHS ENDED JUNE.	
	1909.	1908.	1909.	1908.
Swine-Fever :—				
Outbreaks	173	293	911	1,192
Swine Slaughtered as diseased or exposed to infection ...	1,239	1,889	8,226	6,068
Anthrax :—				
Outbreaks	96	86	718	618
Animals attacked	128	105	955	815
Foot-and-Mouth Disease :—				
Outbreaks	—	—	—	3
Animals attacked	—	—	—	112
Glanders (including Farcy) :—				
Outbreaks	36	60	304	410
Animals attacked	116	155	1,153	1,334
Sheep-Scab :—				
Outbreaks	8	4	456	629

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

DISEASE.	JUNE.		SIX MONTHS ENDED JUNE.	
	1909.	1908.	1909.	1908.
Swine-Fever :—				
Outbreaks	22	18	50	110
Swine Slaughtered as diseased or exposed to infection ...	443	308	797	2079
Anthrax :—				
Outbreaks	—	—	3	4
Animals attacked	—	—	3	7
Sheep-Scab :				
Outbreaks	12	5	285	265

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THE JOURNAL

OF THE

BOARD OF AGRICULTURE

AUGUST, 1909.

CO-OPERATION IN THE TENURE OF SMALL HOLDINGS.

MRS. ROLAND WILKINS (L. JEBB).

The extension of small holdings under the Act of 1907 has brought the subject of co-operation very much to the front. It is, at any rate, not overstating the case to assert that where the isolated small holder is likely to fail, a group of small holders banded together has a chance of succeeding. Already, before the passing of the new Act, in old-established small-holding districts, people complained that they no longer received the prices they formerly enjoyed owing to the competition arising out of the local extension of small holdings. Instead of their position becoming stronger by the advent of fellow-workers, each new recruit was merely one more added to the number who were cutting the throats of their neighbours. There is a danger that this local experience will be extended all over England if serious attention is not paid to the question of organising the production and sale of produce on the thousands of newly-acquired holdings scattered about the country.

We are all familiar with the propositions of co-operation for the purchase of requirements, the hiring of machinery, the sale of produce, &c., and endeavours have been made in various parts to persuade already existing small holders to form co-operative societies for these purposes. I propose in this paper to describe a movement which goes nearer the root of the whole question, viz., co-operation in the initial process of acquiring and holding land.

Apart from the benefits, to be subsequently enumerated, as regards the tenure of the land itself in this manner, the system forms a bed rock on which to build from the very beginning other co-operative methods in the whole process of small-holding cultivation, from the provision of working capital for initial expenses to the ultimate disposal of produce.

I propose, first, to give a very general indication of the present position, which will involve a review of the possibilities introduced by the Small Holdings and Allotments Act, 1908. I shall then proceed to explain what is being advocated by those who wish to carry out the policy of co-operation in the tenure of land, and, finally, give a short description of one or two places where the work has been already begun.

The formation of societies for land-holding is no new idea; but so far it has not taken much root in purely country districts. In the neighbourhood of some manufacturing towns, especially those engaged in the boot trade, voluntary associations have been formed amongst members of the industrial classes for acquiring an estate, which is let out in small lots amongst themselves. In this way individuals who would have been unable single-handed to obtain land have acquired plots on which they work in their spare time and to which they retire to earn a part living in their old age or in slack times.

It is, however, only quite recently that the countryman has attempted anything of the kind. There are, it is true, instances such as the Lincolnshire and the Norfolk Small Holdings Associations, where the association largely consists of men with capital who guarantee the rent paid by the smaller men who hold and cultivate the land. But the associations which I am advocating, and propose to describe, differ in this way: it is the small holders themselves who form the association, pay up so much share capital, and guarantee the rent of the society as a whole—that is to say, each man is individually responsible for his share of the rent of a defaulter.

There have been from time to time various isolated endeavours to apply co-operative methods to land-holding; but it is to the Agricultural Organisation Society that is due the first attempt to carry out this idea on a definitely organised basis. This Society exists for the purpose of introducing and encouraging co-operation in all its branches in the agricultural

community. It is not directly interested in the actual promotion of small holdings. In regard to this question it occupies a neutral position; but it recognises that the welfare and success of small holdings largely rest on the adoption of co-operative methods, and the introduction of such methods comes within the scope of its main objects. When the Small Holdings and Allotments Act of 1907 was passed, the Society realised that an opportunity was given under two clauses for extending its work in this direction. Already, in the Act of 1892, there existed a clause which enabled County Councils to let land to a co-operative society, the members of which were actual cultivators. It was, however, a matter of dispute whether this merely applied to a society farming the land co-operatively or whether the Agricultural Organisation Society could promote co-operation amongst small holders by persuading would-be applicants to form a society and apply to the County Council, as a body, for land.

Under the new Act this matter was made clear, and such powers were further extended in an important way. The County Council is now empowered to let land to any society, co-operative or otherwise, formed to promote small holdings and not working for unlimited profit (*i.e.*, as long as it is not a mere speculating land company), the members of which need not necessarily be cultivators. Further than this, by a special new clause, the County Council may promote the formation of and assist co-operative societies having for one of their objects the provision and profitable working of small holdings.

Any County Council, therefore, has full power under the Act if it so wishes to carry out any desire of its applicants to start from the first on an organised co-operative basis. One would have expected, knowing the difficulties and complications of dealing with many individual applicants unknown to members of the Small Holdings Committee, that it would have taken more steps to advise such organisation among its applicants. It may well be that, owing to the many duties they already have to discharge in an honorary capacity, the members of County Councils have felt that they could not add to these the task of organising applicants, however much this might in the long run lighten their subsequent duties.

There is, however, a further clause in the Act of 1907 which, if used, would throw the burden of such organising work on the shoulders of others and relieve County Councillors of any responsibility beyond the first inception. By this clause County Councils are expressly permitted to employ as agents for this purpose any society which has as one of its objects the promotion of co-operation in connection with the cultivation of small holdings and allotments.

Here, then, was the opportunity of the Agricultural Organisation Society. They recognised the importance of these clauses, which were only too likely to be overlooked by busy County Councillors trying to grasp the main points of the Act in connection with their special duties in acquiring land. A circular letter was therefore sent by the president of the Society, Mr. Yerburch, M.P., to all the County Councils, calling special attention to the clauses mentioned above, and offering the services of the Agricultural Organisation Society, whose experience in such work is perhaps unique. This circular ran as follows :—

My Committee venture to suggest that, as a preliminary to the provision of small holdings, your Council should take steps through this Society to organise those desirous of obtaining them into co-operative societies having power to acquire land and sub-let it to members. Under Section 4, Sub-Section (3) of the Small Holdings Act, 1892, County Councils have power to let land to such societies, and the power is confirmed by Section 9 of the 1907 Act.

The formation of these Societies would greatly facilitate the work of the County Council in providing small holdings, since they would be dealing, in any district, with a single body instead of with a large number of individual holders. The rents, too, would be collected by the Society and paid to the Council in one lump sum. The holders, moreover, being already co-operatively organised, could undertake without difficulty the purchase of requirements or sale of produce on co-operative lines, or any other form of agricultural co-operation.

The Agricultural Organisation Society is prepared to provide model rules for such small-holdings societies, to send down an organiser to explain how these societies are formed, to see to the formalities of registration, and to give subsequent guidance when needed.

This letter, sent out in October, 1907, is the first step in the history of the first organised movement to deal with the co-operative holding* of land. Unfortunately, save for a few inquiries, no response was made by County Councils beyond

the usual formal acknowledgment, and in one or two instances only has the Society been asked for advice or assistance.

This, however, has not been the case amongst small holders themselves. At once on the passing of the Act, demands began to come in from country districts where the Agricultural Organisation Society had already obtained a footing for help in forming land-holding societies which could apply as a body to the County Council under the new Act.

By Michaelmas, 1908, within nine months of the Act coming into force, 80 such societies had been duly registered. At the present time the total number for England and Wales has reached 98 in 27 different counties.

The increase of work entailed by this new development made great inroads on the resources of the Society. Without an increase of staff it would have been impossible to respond to the great demands put upon it by the increase of small holdings. It was therefore decided to apply to the Board of Agriculture for a grant under Section 39, Sub-section 4, of the 1907 Act, which gives power to assist societies having as one of their objects the promotion of co-operation. This request was finally granted, and the Board decided to allow the Society an annual grant equal in amount to that of the subscriptions raised in each year by the Society itself, provided that this sum reached a minimum of £1,200—the amount received for the year 1907-8. Every pound, therefore, privately subscribed to the Agricultural Organisation Society brings in another pound from the Board of Agriculture for the furtherance of the work of co-operation amongst small holders. Three special organisers have recently been appointed by the Society and have already taken up the work of visiting all districts from which demands for help come.

Having now given the general outline of the position of affairs at the present time, I propose to proceed to a more detailed description of the methods advocated by the Agricultural Organisation Society in co-operative land-holding. This may perhaps best be done by giving some extracts from the leaflet issued by the Society, in which they advocate that in preference to letting land direct to small holders, County Councils should let to groups of persons, organised into

registered co-operative societies, which should sub-let it to members :—

1. The system simplifies the collection of the rent. Instead of having to collect the rent in separate sums from a number of small holders, the Council obtains it in a lump sum from the Society. The Society in turn collects the rents from the members, and is able to collect it more easily than an official of the Council could do. All agents who have had to do with small holders know the difficulty of dealing with them individually; a committee composed of small holders themselves can deal with them more effectively and with less friction than the agent of an outside landlord.

2. Provided the Society has a considerable amount of uncalled share capital, the security for the rent will be greater, since the failure of any member to pay his rent will not relieve the Society from the responsibility of paying the full amount due.

3. The small holders should be able to obtain the land at a lower rent. The Council will be relieved from the necessity of employing a collector, and will have greater security. It can, therefore, let the land more cheaply, and as the management expenses of the Society will be very small, the Society can sub-let to a member at a rent only very slightly increased.

4. Being, as indicated in Section 2, liable to suffer loss by the failure of any fellow-member to pay his rent, the small holders will have an interest in looking after one another and helping one another in any difficulties that may arise. This is perhaps the most valuable result of adopting the co-operative system of land tenure.

5. For the same reasons, the committee of a society will make careful inquiries as to the suitability and capacity of each of the members desirous of acquiring small holdings, and will not apply for land on behalf of any member who is not likely to be a successful small holder.

6. As they will be already organised co-operatively, and will have a sense of mutual interest, the small holders will be more disposed to co-operate for credit banking, insurance, and other purposes, wherein co-operation is admittedly essential to the success of small holdings.

7. The Society will have a stronger hold over its members than the Council would have over them as direct tenants. It can make more stringent tenancy regulations, and will be in a better position to insist that they shall be carried out.

The same arguments apply equally to the co-operative tenure of allotments, and the A. O. S. advocates that parish, urban district, borough, or county councils, when creating allotments, should let the land to co-operative societies, composed of persons desirous of obtaining allotments, which would, in turn, sub-let it to their members.

It has been already mentioned that the Society has drawn up model rules for co-operative societies. Amongst these rules are two which have been inserted by the Board of Agriculture, and which must be observed by all societies wishing to acquire land under the Small Holdings Act, 1907. One of

these specifies that one of the objects of the Society shall be :—

To carry on the business of creating and promoting the creation of small holdings or allotments, and encouraging their proper cultivation, with power to acquire land from local authorities acting under the provisions of any Act for the time being in force relating to small holdings or allotments or from any other person or body; to adapt any land so acquired for small holdings or allotments by the erection of dwelling-houses or other buildings and the execution of any other improvement, and to let the land to members of the Society to be cultivated by them as small holdings or allotments.

The other rule inserted by the Board provides for the keeping of separate accounts for small holdings and allotments business, and lays down what are the purposes to which all money received for land may be devoted. The object of this rule is to ensure that the accounts in respect of small holdings shall be kept distinct from the accounts in respect of trading when the society is engaged in both branches of co-operative work.

On one other point the Board of Agriculture have insisted on certain conditions, and that is on the question of the scale upon which the share capital of the society should be raised. These conditions are that either (1) the total share capital of the society, called and uncalled, should be equal to three years' rent of the land occupied, or (2) that the society should pay six months' rent in advance, and its uncalled share capital should be equal to a further eighteen months' rent.

These conditions appeared somewhat stringent at the time they were laid down. As, however, those societies which have already acquired land have complied with them without difficulty, and a very large number of societies have adopted them in their rules, it seems as if they did not act as a deterrent. In the few cases where objections were raised it was found that these arose from a misunderstanding of the conditions. The attitude taken up by the Board of Agriculture on this question is to advise County Councils that, where the rules of a society are in accordance with the Board's regulations as to share capital, the Council need not make detailed inquiries into the capital of individual applicants, but should leave such matters in the hands of the society, who are, as a whole, responsible for the rent. The Board consider, however, that

Councils should obtain satisfactory assurances from the committee of the society that their members have sufficient farming capital, and for this purpose it will usually be desirable that the committee should be interviewed on behalf of the Council.

I now come to the last part of my paper, and propose to give a brief description of a co-operative small-holdings society holding land from a County Council under the Small Holdings Act, 1907. I shall take for this purpose the Mere and District Small Holders, Limited, the first one to obtain land in this way. This society is already in possession of a farm of 452 acres, on which 28 small holders are installed. Mere is situated on the borders of Wiltshire and Dorset, four miles from Gillingham, on the L. and S.W. Railway. There were already a certain number of small holders in the district, who, with 20 to 40 acres of land, kept milking cows and disposed of their produce to two milk factories at Mere and Gillingham. Some of these men were anxious to enlarge their holdings, and other applicants required land to work in conjunction with their present occupations. The movement was started in the first instance by the circular letter addressed to the Parish Council by the County Council, sent out on the advice of the Board of Agriculture, inquiring as to the demand for land in the parish. In response to this, 17 applicants sent in their names. At a subsequent meeting it was suggested that the applicants should form themselves into a co-operative society for the purpose of acquiring land, and the men appeared at once to realise the advantages of this course. Model rules were sent down from the Agricultural Organisation Society, and the society was duly formed and registered in May, 1908. A committee was appointed to conduct negotiations. There was reason to believe that a farm belonging to the Duchy of Cornwall immediately adjoining Mere might be available if an application were made. This farm was ultimately acquired by the County Council, and let as a whole to the society for a term of twenty-one years, with the option of continuing the lease for thirty.

The society pays rates and undertakes repairs. The rent charged to the small holder is inclusive of everything, and works out at from 22s. to 44s. per acre.

Each member holding land provided by the society is obliged to take twelve shares for every acre of land he holds. The nominal value of the shares is 5s., of which 6d. is paid up, making 6s. paid-up capital on every acre of land. Further calls are limited to 1s. per share, with three months' interval. It was particularly in the division of the land amongst the applicants that the benefit was felt on both sides in having it carried out by a committee of the society rather than by an agent of the County Council. All the men had local knowledge of the conditions which required fulfilment, and were, moreover, acquainted with one another's affairs. As each man was in a sense responsible for the rent of his neighbour, judgment was displayed as to the amount of land allotted to each one, having regard to his ability to pay or the likelihood of his cultivating the land in a satisfactory manner. A great spirit of fairness was shown in distributing this insufficient acreage amongst the would-be small holders, a task which it would have been almost impossible for an outsider not living on the spot to have carried out in such a satisfactory manner. In some cases lots had to be cast; several men withdrew in favour of those who had not yet had a chance of getting on to the land, and it was necessary to cut down the requirements of many to a lower limit.

The farm in the first instance was valued field by field, the valuer regarding it from the point of view of a single tenant for the whole farm. This value was used as a basis in determining the rent to be charged each man on its accommodation value, viz., according to the convenience of its position to roads or its proximity to the man's residence, &c. The buildings consist of several detached blocks of farm buildings, a dwelling-house, three cottages, and a dairy-house. The house and one cottage remain in the hands of the former tenant, the other cottages, with land attached, forming three self-contained small holdings. A large barn, a rick 'yard, and a chaff-cutting house are held collectively; the cow tyings, stalls, and cart sheds are let out to individual members at prices ranging from 3s. 6d. upward per section. Over £100 was laid out in fencing and in alterations of gateways, doors to buildings, &c. The buildings, lying as they do in separate blocks, lent themselves easily to sub-division; the

land also was already cut up into convenient sized fields with access to roads, so that little fencing was necessary. As regards subsequent fencing, the society supplies materials and the tenant furnishes the labour. The farm comprises 139 acres of down land, 250 pasture, and 44 arable. The pasture is let in 27 lots, from under 1 acre to 27 acres in size; the average rent is 36s. per acre. The down land is held collectively; everyone with over 3 acres of land must hold one lease, *i.e.*, grazing for one head of stock. Milk production being the main occupation of the small holders, the down land is found useful for turning out dry cattle and young stock. The milk is disposed of, as already mentioned, to the two factories at Mere and Gillingham.

Of the 28 small holders, 11 are making their main living off the land only, the remainder using their holdings as adjuncts. Of these, all have had previous experience in farming except six, who, however (with the exception of one man holding 24 acres), only hold a few acres. All the men live in Mere or outside on the edge of the farm itself, so that there has been no difficulty in the provision of buildings. The men entered on the land at Michaelmas, 1908, and at once replaced on the land the same head of stock which had formerly been kept on the farm. The half-year's rent was also punctually paid up.

A point of interest in connection with the development of this scheme is that the men have begun to co-operate in a small way amongst themselves without any suggestion from outside that they should do so. Some of those who are milk-producers arrange together so that one of their number only delivers the milk at the factory. A gradual extension of such methods from these beginnings will no doubt lead to a wider system of co-operation, which will have arisen from the fact of the men having started the scheme from its first initiation with the co-operative idea.

The Mere Small Holdings Association is an example of what has been done in a purely agricultural district to supply men with land which they will cultivate as small farms.

At Biggleswade, in Bedfordshire, another society formed under the 'Agricultural Organisation Society has got its members installed on farm land, which they are cultivating

on market-garden lines. Biggleswade is the centre of the market-gardening district in Bedfordshire, and every man is brought up to this type of cultivation. The Biggleswade Small Holdings Association was registered in May, 1908, and acquired a farm under the County Council at the following Michaelmas. The farmhouse is let off with some of the land and buildings to one applicant. The rest of the land is marked out in 5-acre holdings, for which the members cast lots.

In Northamptonshire there has been a development of the movement on wider lines. A central association—the Mid-Northamptonshire—working under the guidance of the Agricultural Organisation Society, has formed 27 local societies in the villages within its area. Of these, 10 are either in possession of land or negotiations are in an advanced state for supplying them. This method seems to be nearest the ideal to be aimed at of local knowledge combined with central control.

The above instances will perhaps be sufficient to show the lines on which the A. O. S. is working, but I should like before closing my paper to recall briefly how the policy they advocate will go far towards removing some of the difficulties which even the most hopeful advocates of small holdings must be prepared to encounter.

The chief fear in the minds of those responsible, both for the rates and for putting the Act in force, is the possibility of the land acquired being given up after a few years and thrown on to the Council's hands; this may either be due to the defaulting of an unsatisfactory tenant or to the temporary financial difficulties experienced by a small holder after a run of bad seasons. In either case the work is very greatly lessened should the man be a member of a co-operative society. The society as a whole being responsible for the rent, and also for the standard of cultivation covenanted for in the lease, will in the first instance have subjected their members to a far more vigorous and yet fairer process of selection than is possible for a small-holdings sub-committee without intimate local knowledge.

It will be more likely, therefore, that unsuitable applicants are weeded out in the first instance. In the second place,

greater pressure can be brought to bear on any defaulter by his fellow-members, who are to suffer for his shortcomings, than could be exercised by any officer of the Council. Thirdly, should a holding be thrown up, it will come on to the hands of the society and not on to the County Council. The former, therefore, will see to it that the land is taken up amongst themselves should no suitable new-comer be forthcoming. Amongst the societies already registered it is noteworthy that the names of a number of those who applied for membership in the first instance, before the sense of responsibility was realised, do not appear in the final list.

Again, to take the case of a satisfactory tenant in financial difficulties arising through no fault of his own, experience has proved in the case of co-operative societies that assistance is forthcoming from his fellow-co-operators to tide him over temporary embarrassments.

Lastly, the immense advantages of the organisations I have been describing, whether it be in the preliminary acquisition of land or in its subsequent division and tenure, have been very greatly appreciated wherever the system has been tried. Testimony is forthcoming, not only from the co-operators, but from those engaged in administering the Act, of the comparative ease with which the countless difficulties are smoothed over, and how the ultimate satisfaction of all parties is reached whenever the men work together as a body.

At the risk of repetition, I would urge that, as it is admitted that the success of the small-holdings movement depends on co-operation, no pains should be spared to see that the co-operative idea is at the root of every scheme for the further extension of such holdings.

It is to be hoped, therefore, that County Councils will not only make earnest endeavours to supply those societies already registered with the land for which they are waiting, but that they will show increased activity in encouraging their individual applicants to avail themselves of the proffered help towards organisation.

THE EXPERIMENTAL ERROR IN FIELD TRIALS.

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In all experimental work some error is inevitable; it is only on paper that results come out exactly, but when dealing with things, even the simplest measurements involve an error, the magnitude of which depends on the methods employed. A carpenter measuring a table with a foot-rule can with care be exact to within an eighth of an inch; the maker of fine machinery will only allow himself a margin of about a thousandth of an inch; while it is possible with the utmost refinement to make sure of the length of a small piece of polished metal to within about a millionth of an inch. Granting, then, that it is impossible to eliminate error and that absolute correctness is unattainable, the scientific method is to ascertain how large the error is likely to be and decide whether it is such as will vitiate the conclusions drawn from the experiment.

As a rule, we can do this most readily by repeating the measurement, changing, if possible, the process and the instruments used; a consideration of the differences in the results obtained will then show us what is the most probable result and within what limits it is likely to be correct. If, for example, successive measurements of a piece of land bring out the area as 184, 184·3, 183·5, 184·6, and 183·3 square yards, we may accept 184 square yards, the mean of the results, as the most probable area, and we may further conclude that we are then not likely to be more than a quarter of a square yard wrong on one side or the other. The more measurements we make the nearer the mean will be to the truth, always provided that there is not some definite source of error which is repeated in all the experiments, such as would be caused by want of truth in the measuring tape in the example we have been using.

Field trials, whether they are to test the effects of different manures, or different varieties of the same crop, or variations in the cultivation, are generally recognised as being subject to a large number of sources of error, so that it becomes of considerable importance in drawing conclusions from such experiments to know what degree of accuracy in the results we

can expect, supposing all the conditions to have been favourable. Of course, after a set of field plots have been laid out, great variations in the soil may reveal themselves, due either to changing subsoil and drainage or to some past irregularity of manuring or cropping. Again, the plots may suffer most irregularly from some insect or fungoid attack. In these cases one must ignore the results entirely, and begin afresh. But supposing the field to be sensibly uniform and a good stand to have been obtained, what sort of differences in the yields from two plots may be taken to indicate an effect of the treatment they have received, and what must be regarded as covered by the natural variation due to unknown causes?

We may take the Rothamsted experiments as satisfying all the external conditions of accuracy; the land is reasonably uniform, more care is given to the plots than would be possible under ordinary farming conditions, while the staff have both experience and organisation to ensure accuracy in weighing and measuring the produce. If we then select from the Rothamsted records various pairs of plots receiving the same treatment, we find at once that they do not give similar yields year by year, but vary with considerable irregularity. As an example, we may take the two unmanured plots on the grass field and set down both their actual and relative yields for the last fifty years. If the soil of the two plots is identical, they should show the same result after a certain number of years; but if there is some permanent difference between the two revealed by the averages, it will be possible to see how far this difference would be made evident by a single year's trial.

Looking at the relative yields set out in Table I., we see that Plot 12 in 37 years out of the 50 gave a bigger crop than Plot 3, but on 13 occasions it gave less: taking the mean of the whole period, its relative yield is 110 against 100 for Plot 3. Granting, however, that it is really about 10 per cent. the better plot, there have been many years when it gave a 30 per cent. better yield, and in one year it was 96 per cent. better; on the other hand, it was on two occasions 10 per cent. below Plot 3. Mathematicians have devised a process whereby we can calculate from such a collection of results the value we may safely attach to the result, and using this

method, we shall find that the "probable error" of the mean result is about 2 per cent.; *i.e.*, from the fifty years' results we may conclude that there is an inherent superiority in

TABLE I.—*Actual and Relative Yield on Two Unmanured Grass Plots, Rothamsted.*

	Yield of Hay.		Relative yield of Plot 12. Plot 3 = 100.		Yield of Hay.		Relative yield of Plot 12. Plot 3 = 100.
	Plot 3.	Plot 12.			Plot 3.	Plot 12.	
	lb.	lb.			lb.	lb.	
1856	2,515	2,351	93	1882	2,524	2,340	93
1857	2,856	2,592	91	1883	2,266	2,322	102
1858	2,472	3,360	136	1884	1,804	1,996	111
1859	2,540	2,576	101	1885	2,101	2,339	111
1860	2,760	2,884	104	1886	2,547	2,672	105
1861	2,844	3,304	116	1887	1,471	1,330	90
1862	3,052	3,424	112	1888	2,296	2,298	100
1863	2,284	2,844	125	1889	2,638	2,383	90
1864	2,688	2,808	104	1890	1,648	1,565	95
1865	1,296	1,932	149	1891	2,060	2,422	118
1866	2,660	3,012	113	1892	1,627	2,130	131
1867	3,332	3,048	91	1893	391	487	125
1868	1,960	2,676	137	1894	2,685	2,538	95
1869	4,256	4,352	102	1895	1,402	1,399	100
1870	644	1,260	196	1896	1,144	1,272	111
1871	2,844	2,960	104	1897	1,742	2,048	118
1872	1,644	2,252	137	1898	1,922	2,256	117
1873	1,372	1,804	131	1899	1,342	1,788	133
1874	1,412	1,642	116	1900	1,379	1,859	135
1875	3,620	4,232	117	1901	455	765	168
1876	1,384	1,599	116	1902	1,004	1,200	119
1877	2,304	2,165	92	1903	1,509	1,571	104
1878	1,848	1,832	99	1904	2,949	2,872	97
1879	3,028	3,157	104	1905	1,936	2,297	119
1880	848	1,081	127				
1881	1,480	1,393	94	Average	2,057	2,254	110

TABLE II.

Plot.	1904. Swedes.	1905. Barley.	1906. Mangolds.	1907. Wheat.	1908. Swedes.	Mean of 5 years.
A ...	98.1	88.8	95.8	86.3	92.8	92.3
B ...	95.8	92.4	90.6	95.1	94.9	93.7
C ...	101.0	98.9	99.2	102.4	100.2	100.3
D ...	101.7	114.1	105.0	109.1	114.9	109.0
E ...	103.4	105.8	109.2	107.0	97.3	104.5

Plot 12 over Plot 3 which is certainly more than 8 but less than 12 per cent. The mean error of a single year's result is, similarly, 10 per cent.

Taking another example, Table II. gives the results obtained in the last five years on five plots in Little Hoos Field

which have received exactly the same treatment; in order to make it easier to judge the figures, the actual yields each year have been reduced to a common standard, taking the mean of all the five plots as 100.

The experiment had to be started on the assumption that all the plots were exactly alike, and if so, the mean error attaching to the result of a single plot in any year is 7·5 per cent., but with the five years' trials it is beginning to be clear that there are some real permanent differences between the plots, which improve from A. to E. Still, whatever may be the real position of each plot as revealed after further years of experiment, we may expect in any one year to find a particular plot 7·5 per cent. in error on one side or the other.

Space does not permit of the consideration of more cases, but the general result of the examination of many series-of-experiments indicates that the mean error attached to the yield of a single plot is about 10 per cent. plus or minus. In other words, if we have three experimental plots giving yields of 91, 100, and 109 respectively in any one year—for example, 18, 20, and 22 tons of roots—it is not right to conclude that such differences have been brought about by the treatment; the three plots must be considered as giving equal results. Of course this figure is obtained from a consideration of the Rothamsted results only, and other soils might be found on which the conditions were so much more uniform that the experimental error would be reduced and a closer agreement between duplicates would prevail. The examination I have made of other data, however, though they do not permit of working out the mean error over such long periods, yet lead me to suppose that a 10 per cent. error is near the truth generally, and may be taken as a safe guide for working purposes. In the records of experiments a good deal of strained argument is often spent in explaining results or drawing conclusions from them when the differences are much less than the 10 per cent. which we have thus found to be the average error attaching to a result obtained under favourable conditions. Much of this might have been spared if the experimenter had kept clearly before him the fact that nothing less than 20 per cent. differences have much significance in a single experiment. The only way of reducing the experimental error and

obtaining a closer result is to multiply the experiments, either by repeating them year after year or by increasing the number of plots, preferably both, because there may be constant differences in the soil, while the season also may induce variations in the effect of the treatment. The first step, however, is to multiply the number of plots set aside for each kind of treatment; taking five plots irregularly distributed about the field, we shall obtain in a single year a result that is as accurate as need be, except for special variations induced by the character of the season. Of course this means a considerable increase in the amount of work attached to the experiment. For example, instead of six plots each of half an acre, we ought to take thirty plots of a tenth of an acre, six different kinds of plots and five of each kind; every plot would also need to be harvested and recorded separately. Such a form of experiment is necessary if small differences are to be brought out, as, for example, the differences that exist between the various kinds of barley usually grown in this country.

Increased accuracy is not to be obtained by increasing the size of the plots; it is questionable whether irregularities of soil are likely to be more or less pronounced on large plots, and with very large plots one new source of error is always introduced—the difficulty of getting the cultivations, sowing, harvesting, &c., of all the plots carried through in the same day. As long as the plots are above $\frac{1}{16}$ acre size does not matter much, and the size that is most convenient for the handling of the crop, its weighing, storage, threshing, &c., should be selected, always remembering that it is by the number of plots only that the error can be reduced.

It is altogether wrong to take large plots and then select small areas within the plot for weighing. Such a proceeding introduces the most fatal error of all, a selection biased by the preconceived opinion of the experimenter. It is also incorrect to make allowances for missed plants, as is sometimes done by counting the number of roots and calculating what the weight per acre would have been had there been a perfect plant. Most manures affect the texture of the soil, and therefore the number of plants which establish themselves is one of the factors in the result that is directly affected by the manure.

One or two other practical points are also raised by the recognition of an average error of 10 per cent. in the results of a single plot. In designing field experiments, it is useless to include small differences in treatment which are not likely to induce more than 10 per cent. differences in the yield, unless the experiment is going to be repeated very widely or carried on for several years. For example, in dealing with hay it would be of little use to set out conclusions from comparative plots, one with 1 cwt. and the other $1\frac{1}{2}$ cwt. per acre of nitrate of soda, or in an experiment on roots, one plot with 4 cwt. of superphosphate per acre as against another with 6 cwt.; in each case the differences due to the manuring are likely to be smaller than the experimental error. Finally, in view of a 10 per cent. experimental error, it is no good pretending to an impossible accuracy in recording the results."

For example, we have read the following figures :

		Weight of roots per acre		
		Tons.	cwt.	lb
Swedes, Champion	..	11	9	28
„ Crimson King		14	16	48

Now, putting aside the barbarous units of tons, cwt., lb., so cumbrous to write and difficult to read, what possible value can be attached to the figures representing cwt. and lb. As only the produce from $\frac{1}{40}$ acre was actually weighed and then multiplied up to obtain the figures quoted, the inclusion of a few clods of earth more or less with the roots, or an error of a few inches in the measurement of the plot so as to include one root extra would make a difference in the cwts.; moreover, as duplicate plots would be likely to differ in the tons, very little attention need be given to the cwts. Had the results been written 11.5 and 14.8 tons respectively, the figures would still be a degree more accurate than the reality. Of course, the experimenter must record what he actually obtains to the nearest pound or ounce if his scales tell it to him, but to set out such figures in the published report is to make a parade of accuracy which cannot be sustained.

Returning, however, to our original point of view, we may conclude that as absolute correctness in our results is impossible, it is only by recognising and measuring the extent of the inevitable error that we can reach a due measure of accuracy in the conclusions we draw from them.

AGRICULTURAL EDUCATION IN THE NETHERLANDS.

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As a result of the inquiry into Agricultural Education by a Departmental Committee appointed by the Board of Agriculture, the Professor of Agriculture at Armstrong College, under the direction of the Agricultural Committee of the College, visited the Netherlands in March last for the purpose of inquiring into the arrangements for agricultural education, and more especially into the working of the Winter Agricultural Schools in that country. The following report on this visit has been presented to the College authorities. Lord Reay, the Chairman of the Departmental Committee, made the suggestion to the writer of this report that a knowledge of the working of these schools would be exceedingly useful, in view of the desirability of similar schools being much more generally established in this country. As the work and place of these schools could not be fully realised if they were described by themselves, some particulars are also given of the elementary and higher forms of education—especially agricultural—in that country.

Elementary Education.—This is compulsory. Farmers' sons and labourers' sons must be sent to the elementary schools from the time they are six till they are twelve years old. No teaching bearing on agriculture is given, but simply a good elementary education. The tuition fees are paid weekly, and amount to about 10s. a year. As a rule, the farm labourers' children get no more education than this. Only a few take evening classes later on, but it is hoped to do more in this direction in the future.

Evening Classes.—Each village must make provision for evening classes, and these are attended mainly by the sons of the small farmers. A full course in these extends over two winters, and certificates are given after examination. These classes are subsidised by the State, and courses are applied for either by the Burgomaster or through a local society. They are conducted by teachers from the elementary schools. The pupils must be over fifteen years old, so that they have usually had three years' experience of practical work before

beginning their attendance. The subjects taught and the number of hours given to the work per week each winter are somewhat as follows :—

	First winter. Hours.	Second winter. Hours.
Elementary natural science (chiefly chemistry) ...	2	1
Soil knowledge	1	—
Cultivation of soil	—	1
Raising of crops	2	1
Manuring	—	1
Live stock and dairying	1	2
Total hours per week	6	6

The total number of pupils attending these classes in Holland in the winter of 1907–8 was 2,988, including 237 sons of labourers. There were 221 such courses in all, the average attendance being 13.

Saturday Courses for Teachers.—The teachers' qualification for the evening classes is obtained by attending courses on Saturdays at Goes and other provincial centres for three winters, and by passing the examination connected therewith. These teachers also become advisers of labourers, and even of farmers; they act as secretaries of local societies, and in other ways assist agricultural organisation. Handy little text-books are prepared, usually by the teachers, for the use of the pupils.

Courses of Lectures for Farmers.—The teachers who hold the evening classes also give lectures on six to ten evenings each winter to older pupils and farmers. Only those above twenty-one are now admitted, as the farmers did not like attending with young pupils. Different agricultural subjects are treated, and local veterinary surgeons often give lectures on their own subject. Questions are asked and answered. About twenty such courses were given in the Province of Zeeland last winter, and similar courses are given all over Holland.

Gymnasia and Higher Burgher Schools.—Nearly all the pupils of the winter agricultural schools have attended the elementary schools only, but as a few of them have gone through the Higher Burgher Schools, a short account of these and of the Gymnasia may be given.

The Gymnasia are the preparatory schools for the Universities. Pupils enter these when twelve years old, and remain there for six years. In these the education is mainly

on the classical side, and, although it forms an excellent preparation for an Arts degree or a degree in Law, it is not suitable as a preparation for a course in Science. The six years' work in the gymnasium concludes with an examination which passes the student into the University.

In the Higher Burgher Schools the pupils also enter at twelve years of age, and usually remain for five years. In these the course of instruction is scientific and modern rather than classical, and it is through these schools that science students pass to the Universities, and agricultural students to Wageningen. They have, however, to do some additional private work in languages before they can enter the Universities.

A few of the better-class farmers send their sons to the Higher Burgher Schools, one being situated at Goes, where the tuition fees are £3 6s. 8d. a year. From them they can go direct to the Army and Navy, and to the Universities for a Science course.

Winter Agricultural Schools in the Netherlands.—There are seven winter agricultural schools, situated at Groningen, Leeuwarden, Schagen, Dordrecht, Goes, Sittard, and Zutphen. These are usually open from about October 1st till April 1st, and have an average attendance of about thirty pupils each winter, about half being in the first and half in the second year. The buildings themselves are provided by the town and province in which they are situated, and generally include a few lecture-rooms, with small laboratories and a museum. The farm winter school buildings at Groningen cost just over £2,300. The State makes an initial grant for the equipment of these schools, as well as an annual grant of about £90 for the same purpose. The salaries of the teachers are also provided by the State. Each Director receives about £250 a year, and has from five to seven assistants, most of whom only give part of their time. At Goes the Director also acts as superintendent of field experiments in Zeeland, and advises the State on all agricultural questions. The Directors of the other schools also do other work connected with agricultural education.

The pupils either live in rooms in the town, where they pay from 12s. 6d. to £1 a week and upwards for board and

lodging, or live at home on their fathers' farms. There is no entrance examination, but pupils must satisfy the Director that they have sufficient general education to take the course, and that they have had experience of farm work. They must be at least sixteen years of age. The tuition fees are under 17s. per winter. Nearly all the pupils are the sons of farmers and have been engaged for some years in practical farm work.

The subjects of instruction include the following:—Soils, manures, and crops; the feeding and breeding of live-stock; veterinary hygiene; dairying; agricultural economics; book-keeping, and elementary science. The hours of instruction average about twenty-five a week. The teaching of the first winter is generally devoted to natural science, chemistry, and botany, all bearing on agriculture, while in the second winter the more practical subjects are taught. Instruction is chiefly given in the lecture-room, as laboratory work, except of a simple character, is not considered suitable for this class of student. A veterinary surgeon in practice usually gives instruction in farm live stock and veterinary hygiene. This kind of teaching is not objected to by veterinary surgeons in the Netherlands, as they have found by experience that a farmer who has passed through these winter schools is much more likely to make use of their services, and, what is more important, to send for them before it is too late.

Two of these schools were seen at work, one at Goes, in the Province of Zeeland, and the other at Zutphen, in the Province of Guelderland.

There are no farms connected with these schools. At Zutphen the zoological lecture-room is especially well equipped with specimens, such as the actual mouths of horses, to illustrate the appearance of teeth at different ages, and the teaching specimens of this kind are of a very complete character. At both Goes and Zutphen the students had the appearance of being thoroughly practical young fellows, varying from seventeen to twenty-two years of age.

The Directors of these schools are in close touch with the agriculture of their provinces. One of them answers about 700 letters from farmers, asking for advice, every year. At Zutphen the instructor in dairying acts as dairy specialist for

the Province, and his services in testing milk for, and giving advice to, dairy farmers are of great value and much appreciated. At Goes it was evident that the Director was thoroughly conversant with the agriculture of the whole Province of Zeeland. Advice is given to farmers on all branches of farm work.

The pupils who take these winter courses proceed with farm work at the close of their course. A winter school is not in any way a stepping-stone to the Higher State Agricultural College at Wageningen.

Winter Schools in Horticulture.—Horticulture is a very important industry in the Netherlands. There are four winter schools in horticulture, which are situated at Boskoop, Tiel, Aalsmeer, and Naaldwijk. The course in these schools extends over two winters, and is open to young gardeners, just as the agricultural schools are for young farmers. The teaching given is of a thoroughly practical character. In the school at Boskoop, which was visited, the pupils must have had practical experience before entering, and they work in the nurseries around Boskoop while taking the course. They must also, at the end of their course, work for a time in the Netherlands or elsewhere to complete their practical training in the special branch of horticulture they have adopted.

Analytical Stations for Manures and Feeding-stuffs in the Netherlands.—There are six of these in all, which cost the State annually from £9,000 to £10,000 for salaries and about £3,000 for apparatus, &c., while about £3,000 are received in analytical fees.

An opportunity was taken of inspecting the Station at Goes, in the Province of Zeeland. Over 3,000 analyses of manures, feeding-stuffs, &c., are made annually at this station for farmers. Linseed cake is the principal feeding-stuff used. The fees charged are about 1s. 8d. for each ingredient estimated. About 1,000 analyses of sugar-beet are also made annually, this crop being largely grown in the province.

The manures and feeding-stuffs analysed at this station are purchased for the farmers, and sent for analysis principally through the village co-operative societies. The Directors of these stations have the confidence of both the farmers and the merchants, and act as umpires in any case

of dispute. If a manure or a feeding-stuff is not up to the quality guaranteed, the amount to be deducted from the price is settled by the umpire. These analytical stations are evidently of great value to the agriculturists of the country.

Seed Control Station.—The Seed Control Station is situated at Wageningen, and the staff consists of a Director and a principal assistant, with sixteen workers in the laboratories, who are mostly women.

From 2,000 to 3,000 samples of seeds are tested annually, these being mostly grass and clover seeds. Probably about one-third of these seeds sown in the country are tested. Cereal and other seeds are also reported on, but not to a large extent.

In the reports on samples of seeds, the percentage of impurities and of weed seeds is given by weight, and the germinating percentage is given of the number of pure seeds, and not of the total sample.

Dairy Education.—There is a dairy school at Bolsward, to the north of the Zuyder Zee. As already stated, the Province of Guelderland has a dairy expert, who advises farmers on all questions in dairying. He also tests samples of milk, and does other similar work. Work of this nature is also carried out in the other provinces where dairying is important.

The State Higher Agricultural, Horticultural, and Forestry School at Wageningen.—This is the higher agricultural college of the Netherlands, and, although of University rank, is not a University, nor is it connected with any University.

While the pupils who attend the Winter Agricultural Schools are nearly all the sons of farmers who have already had considerable experience in farm work, those entering Wageningen are nearly all the sons of professional men, merchants, land owners, and of the very limited class of large farmers, and are therefore of a distinctly different type from those attending the winter schools. The total number of students at Wageningen last session was from 150 to 160. The lecture hours are from 8 to 12 noon, and from 2 to 4 p.m. The full course covers three sessions, and diplomas are given in the six following branches:—

(1) Agriculture of the Netherlands; (2) Agriculture of the

Dutch colonies; (3) Horticulture; (4) Forestry of the Netherlands; (5) Forestry of the Dutch colonies; (6) Agricultural Chemistry.

Exceptionally, there is a fourth year's course of study for the Diploma in Colonial Forestry. Exhibitions are given from the Dutch colonies for students taking the special Colonial Diplomas.

The tuition fees for students taking a full course are about £6 13s. 4d. a session of forty weeks. The long vacation extends from July 15th to September 15th, and the Christmas and Easter vacations are each of two weeks' duration. No entrance examinations are required for the diplomas, but students cannot proceed with any of the diploma courses unless they have passed through the Higher Burgher Schools. For students not taking regular courses the fees are at the rate of about 6s. 8d. per week for each lecture. The cost of board and lodging for students in Wageningen varies from 12s. 6d. to £1 or over, according to the character of the accommodation and board required.

The first year's course is approximately the same for all the diplomas, and includes:—(1) Physics and meteorology (three hours' lectures and two hours' practical work per week.) (2) Botany (four hours per week). (3) Geology of the Netherlands (one hour's lecture and eight hours' practical work per week). (4) Organic and agricultural chemistry (four hours' lectures and three hours' practical work per week). (Inorganic chemistry has already been provided in the Higher Burgher Schools, while students coming from the Gymnasia have not had this, and have to take it privately, and to devote two years to their first year's diploma work.) (5) Political economy (two hours' lectures per week). (6) Farm implements and machinery (two hours per week). (7) General knowledge of farm plants (two hours per week). (8) Mathematics (two and a half hours per week). (9) Mechanics (two to three hours per week). All these subjects are taught with the object of showing their bearings on agriculture.

To get the diploma candidates must have obtained the diploma of the Higher Burgher Schools or its equivalent, and have passed an examination at the end of the first year's course for all the diplomas, as well as the special examina-

tion for each diploma at the end of the third year. Attendance at classes is not compulsory before entering for any of these examinations, although such attendance is really necessary. During the second and third years, candidates take different courses for the various diplomas, each course being adapted for its special purpose. Subjects to which special attention is directed for the diploma in agriculture are:— (a) animal breeding, the lectures on which are given by the Director, and (b) veterinary science, which deals with diseases, ailments, and their remedies. The lecturer in this latter subject combines zoological and veterinary surgery qualifications. His museum laboratory is particularly well equipped with zoological specimens, especially those suitable for demonstrations of unsoundness in horses and of diseases of live stock. Other subjects included for agricultural students are agricultural chemistry, book-keeping, estate management, surveying and levelling, building construction, and other work similar to that taken in the second and third years for the degree in agriculture at Armstrong College and at other colleges in this country. At the close of the three years' courses the final examinations for the different diplomas are held.

Post-graduate courses for students who have completed their diploma courses and examinations are also conducted. For these a nominal fourth year's course of study is provided, which really means a two years' additional course, the first year of which is spent by the post-graduates on well-managed farms or in work at agricultural stations in the Netherlands or abroad, while the second year is spent at Wageningen in taking special subjects and in doing research work. Those who have taken such a course may pass a State examination, which is the best qualification in the Netherlands for a higher teaching post in agriculture. Just as a diploma from Wageningen has the status of a degree in a University, so the passing of this Higher State examination is looked upon as being equal to a doctor's degree.

The library has 10,000 volumes, and the librarian gives his whole time to his work.

There are two points in the Higher Agricultural School at Wageningen to which attention may be drawn:—

- (1) Owing to the fact that all students have passed through

the Higher Burgher Schools before entering this school, and as this implies that a full course has been taken in inorganic chemistry and other science subjects, the three years' course gives full time for specialisation in agricultural, horticultural, and forestry work.

(2) The staff includes twenty-five experts, all of whom are devoting themselves to the special branch of work on which they are engaged and its bearings on agriculture, with the result that the whole work of the course is brought into very close relation with its practical applications. The thoroughness with which the subjects of veterinary science (including diseases of animals), insect pests, and plant diseases, are dealt with, is an especially striking feature.

The Director of the Higher State School at Wageningen stated that they aimed at being as thoroughly scientific as possible, but, at the same time, they kept in close touch with practice. Mr. Kakebeeke, the Director of the Winter Agricultural School at Goes, and a former student at Wageningen, who has visited most of the higher agricultural education institutions in Europe, expressed his conviction that Wageningen compared very favourably indeed with the best of the Higher Schools in Agriculture and Forestry in Germany.

Institute of Phyto-Pathology.—This Institute, which deals with diseases of plants and insect pests, is also situated at Wageningen. The Director, Dr. Ritzema Bos, who has a world-wide reputation, deals annually with nearly 2,000 inquiries from various parts of the country, and also gives certificates to nurseries that are free from scheduled plant diseases. Nursery exports are very important in the Netherlands, and many countries, including the United States and South Africa, require nurseries from which the produce is sent to be certified as being free from disease. The Institute is most completely equipped with specimens of all kinds. The grounds extend to about 20 acres. There is an excellent arboretum and an orchard with specimen fruit trees, as well as a considerable space for horticultural work.

Dr. Ritzema Bos lectures on diseases of plants and on insect pests to the students from the Higher State School in this Institute. He takes his subjects in alternate years, insect pests one year and plant diseases the next. The thorough-

ness which is characteristic of all the teaching at Wageningen is shown by the fact that Dr. Ritzema Bos gives special courses in these subjects to agricultural, horticultural, forestry, and colonial students respectively, which means giving four separate courses in these subjects.

General Notes.—The total area of the Netherlands is slightly over 8,000,000 acres, and the total population in 1907 was about 5,740,000. There are 336,000 acres under woods, 2,125,000 acres under crops, and 3,125,000 acres of meadow and pasture land. The figures both of population and area represent only about one-seventh those of Great Britain. While, however, the rural population in Great Britain is only 23 per cent. of the total, it is probable from figures obtained in the Netherlands that the rural population in that country is nearly 35 per cent. of the total. The wages of farm labourers vary from 10s. to 12s. 6d. a week, and they live, as a rule, in small villages, where they themselves pay the rent of their houses.

The farms are much smaller in the Netherlands than in this country. There are only twenty-four holdings in all which are over 450 acres in extent, and the great bulk of the farms are under 150 acres in area. Nearly all the smaller farmers are members of the village agricultural co-operative societies, which receive every assistance possible from the Directors of the Winter Schools and of the Analytical and Seed Control Stations. The pupils who have gone through the winter agricultural schools have been made thoroughly conversant with the advantages of these co-operative societies, and know how to make use of the various agricultural stations by getting advice as to the purchase and analysis of manures and feeding-stuffs, the feeding of dairy cows, &c., &c. The result is that the agricultural population of the Netherlands receives far greater benefits from agricultural education than that of this country. The development of the winter agricultural schools in the Netherlands has contributed to a large extent to this excellent result.

As an example of what can be done by applying agricultural science to the reclamation of land, it may be mentioned that over 105,000 acres of fen and peat land have been reclaimed for agricultural purposes in the Province of

Groningen, the first operation being the disposal of the peat for fuel and other purposes.

This land belonged to the town of Groningen, but has now been sold to farmers. When the peat was cleared off, the sandy soil which remained contained really no manurial constituents, but was of a good physical character. At first town manure from Groningen was used with good results, and this manure went up to a high price; but now the cost of this horse and cow dung has been greatly reduced owing to the use of artificial manures. This land has greatly increased in value, and is now about as valuable as any in Holland. Potatoes are grown with great success on this newly reclaimed land. In this case, therefore, 105,000 acres of sandy soil, nearly destitute of plant food, have been made fertile, mainly by the scientific application of artificial manures. The original condition of the land, however, before reclamation, was of an exceptional character, and is probably not to be found on any considerable area of unreclaimed land in this country.

The total annual cost of Agricultural Education to the Government of the Netherlands is now about £50,000, and in addition about £4,200 is contributed annually by the provinces.

In conclusion, great indebtedness must be expressed to the following gentlemen, who most courteously gave every assistance in the course of this inquiry:—Mr. Lovink, Director-General of Agriculture at The Hague; Mr. C. Roest, Deputy Director-General of Agriculture at The Hague; Mr. F. Smid, Director of Agricultural Statistics at The Hague; Mr. L. Broekema, Director of the State Higher Agricultural School at Wageningen; Mr. T. G. J. Kakebeeke, Director of the Winter School of Agriculture at Goes; Dr. De Ruyter De Wildt, Director of the Analytical Station at Goes; Mr. D. S. Huizinga, Director of the Winter School of Agriculture at Zutphen; and Mr. C. H. Claassen, Director of the Winter School of Horticulture at Boskoop. The great courtesy shown by the Director-General and the large amount of help given by Mr. Kakebeeke, who has made a study of the Agriculture of Britain, were of especial service.

The botanical order *Polygonaceæ* includes a number of plants which are extremely troublesome both to the farmer and gardener, several species of the genus *Rumex*, or docks, being of a particularly exasperating character.

**Docks and
Sorrels.**

These species of *Rumex* are indiscriminately known as Docks, two species, however, being almost invariably recognised as Sorrel or Sorrel Docks. Weeds of this genus occur on both arable and grass land, and all those considered here are perennial in habit.

The Common or Broad-leaved Dock (*Rumex obtusifolius*, L.) is a practically ubiquitous weed occurring in arable and meadow land, waste ground, &c. It is an erect plant, with a stout stem from one to three feet in height, and a large, strong, tapering rootstock descending deeply into the soil. The leaves from the base may be a foot long, and are oblong-lanceolate, with a somewhat waved margin and a slender stalk. The narrow panicle is leafy towards the base, and the small flowers, which appear in August and September, are on slender pedicels, and give rise to brownish triangular fruits resembling buckwheat. When in flower the panicle has a reddish-brown tinge.

The Curled Dock (*Rumex crispus*, L.) occurs in similar situations to *R. obtusifolius*, and may also be described as ubiquitous. The stout stem is branched (Fig. 1), and from one to three feet in height, and the rootstock is similar to that of the species mentioned above. The lanceolate leaves are from six inches to one foot in length, and much waved and crisped along the margins. The panicles are erect and branched, and consist of crowded whorls of small reddish or greenish flowers; the fruits are triangular and brown. Flowering takes place from June to October.

Other docks are more or less similar to *R. obtusifolius* and *R. crispus*—for example, *R. pratensis*, L., and, in damp grass land, *R. aquaticus*, L.—and all are harmful when they occur in either arable or grass land. The species already described are common to almost all soils, and unfortunately possess the power of producing adventitious buds on their roots. Should a dock be cut off well below the crown, the portion of the root left in the soil will at once produce adventitious buds,



FIG. 2 — SHEPHERD'S SOARER (*Rumex acetosella*, L.)

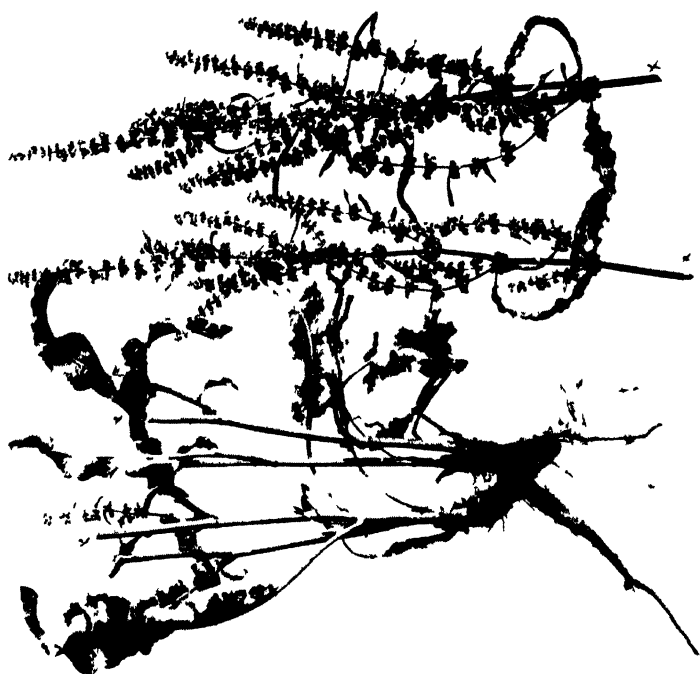


FIG. 1 — CURTLED DOCK (*Rumex crispus*, L.)

and form a new plant, while the part cut off will not necessarily die, but, if left on the ground, may take root and produce flowers and seed. The seeds are a too common impurity in grass and clover seeds, and Mr. Martin J. Sutton says * that comparatively few samples of clover harvested in this country are entirely free from dock seed.

In grass land these species of dock must be attacked by regular spudding, or by removal with the docking iron when the ground is soft. The operation should take place well before the flowering period is reached, and all parts or plants removed should be burnt. It is the height of folly to throw docks into the hedgerow or ditch, for they are practically certain to live and produce seed in their new quarters. A pinch of sulphate of ammonia placed on the cut surface of the spudded docks will almost certainly destroy the root. The fleshy roots of docks are so deep-seated that it is nearly impossible to remove them completely, the result being that the portion left grows again.

Where arable land is infested with docks the best course is to remove them bodily during the ordinary tillage operations, deep ploughing being necessary, and they are frequently so plentiful that special efforts must be made to collect them on ploughing and harrowing after harvest, this autumn cleaning being very beneficial. "Docking," or pulling up the docks by hand, in connection with growing crops is a too common necessity on the farm, but must be continued where docks abound as long as the crop is not too tall to render it impracticable. If a field is seriously infested with docks, the shorter the rotation the better will be the chance of getting rid of the weed. Seedlings should be eradicated by hoeing, and it has been remarked † that "were the hoe used in the root crops later in the year—in the autumn—seedling docks and seedling couch, which become established after that time, would have little chance of causing trouble." As in the case of other weeds, the greatest care should be taken to obtain only pure agricultural seeds, free from the seeds of docks.

Sheep's Sorrel (*Rumex Acetosella*, L.) is a perennial dock of small size—six to twenty inches in height—with a smooth, slender, branched stem, and a much-branched, extensively-

* *Permanent and Temporary Pastures*, 1908.

† *The Complete Grassier*.

creeping rootstock (Fig. 2). The lower leaves are hastate, or somewhat arrow-head shaped, and borne on long stalks, while the upper leaves are sessile and narrowly-lanceolate or linear. The panicles of small flowers are several inches long, branched and leafless, and male and female flowers are borne on separate plants. Flowering takes place from May to August. Owing to the presence of acid oxalates, this plant is acid to the taste. Towards late summer and autumn it becomes reddish in colour. The small, triangular, yellow-brown fruits are a common impurity in clover and grass seeds.

Sheep's Sorrel is typically a weed of dry pastures, and is held to be an indication of poor, sour land; it is also very common in hay land, and also often occurs in arable land. Hall says* that in arable land the presence of this plant is a pretty sure sign of the absence of lime. Like other useless plants, Sheep's Sorrel replaces good herbage, and the best way to get rid of it is by improving the condition of the fields in which it occurs. This may be brought about by systematic manuring, and by the application of lime at the rate of 30 cwt. per acre if the land be light, or up to 3 tons per acre if the soil be heavy and wet. On heavy land basic slag will be of much value. In arable land, the application of lime in conjunction with tillage operations and the removal of the creeping roots will have the effect of reducing it.

Common Sorrel (*Rumex Acetosa*, L.), the leaves of which are so commonly eaten by children on account of their pleasantly acid taste, somewhat resembles Sheep's Sorrel. It is, however, larger (one to two feet), and has a slender, simple stem, while the leaves are much larger and longer stalked than in the case of the other species. The branched panicle is leafless, and opens its flowers between May and August, the male and female flowers being on separate plants. The rootstock is a slender and tufted tap-root. Common Sorrel, Sour Dock or Sourock, is a perennial which occurs in most meadows, sometimes in great quantity. If not too plentiful, it may be spudded or regularly cut down, but removal by hand is impracticable as the tap-root is deep-seated. Dressings of mixed artificial manures tend to weaken the Sorrel,

* A D Hall, *Fertilisers and Manures*, 1909

while they at the same time encourage better herbage, and so choke out the weed. Regular cutting should be combined with manurial treatment.

The following article on the Plum Sawfly has been contributed by Dr. R. Stewart MacDougall:—

**The Yellow-horned or
Plum Fruit Sawfly**
(*Hoplocampa fulvicornis*,
Klug.).

There is no doubt that the Plum Sawfly, which has been recorded from different parts of the country, is a very dangerous enemy of the different varieties of plum, and efforts should be made to restrict the damage and to prevent the spread of the insect. As regards destructive measures, the Plum Sawfly is most vulnerable in its larval stage before it has left the plum, and in the cocoon stage in the soil.

Hoplocampa fulvicornis is an insect well known in Continental literature,* along with its close ally the Apple Sawfly (*Hoplocampa testudinea*) (see Leaflet No. 205).

DESCRIPTION.—*Imago*: The adult sawfly measures about $\frac{1}{2}$ inch in length and $\frac{1}{3}$ inch in spread of wings. Its colour is glossy black; the antennæ are bright yellow or yellow-red, often brown at the tip. The wings are clear like water.

Egg: The egg is greenish-white and translucent.

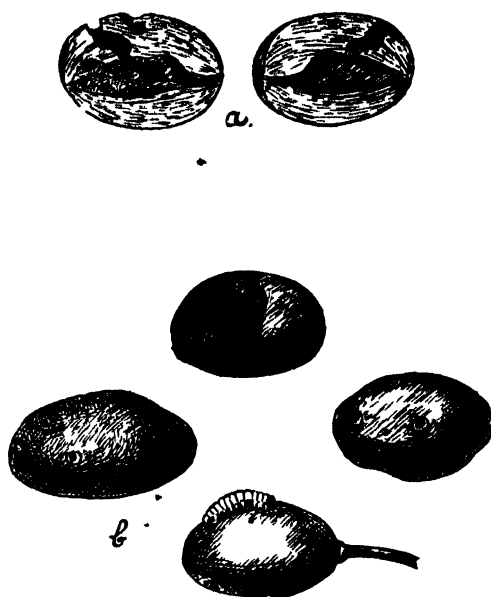
Larva: The larva (Fig. b) is a 20-legged caterpillar, the abdominal prolegs being somewhat paler than the six thoracic legs; the body is wrinkled and whitish-yellow, with a faint brown shade in older larvæ; the head is brown; the jaws are red-brown; the eyes are black; the body narrows at the hind end. The larvæ have an unpleasant odour.

Cocoon: The cocoon, under cover of which pupation takes place, is cylindrical, brown, and covered with particles of soil.

LIFE HISTORY.—The adult sawflies appear in spring or early summer with the opening of the blossom-buds. The female saws a slit, by means of her egg-laying apparatus, in the calyx, and in it lays an egg, one egg for each flower-bud. When the egg hatches the larva eats its way to the kernel of the ovary—the stone is at this time quite soft—and feeds on

* See *Praktische Insekten-Kunde*, by Taschenberg, Part II, p. 324; also "The Plum Sawfly" (*Tenthredo morio*, Fabr.), by Canon Schmidberger, in *A Treatise on Insects*, by Vincent Kollar, p. 268.

it, and it may be on the surrounding tissue (Fig. *a*). In a month and over the larva is full grown, $\frac{1}{2}$ -inch in length, and falls to the ground in the spoilt fruitlet; it leaves the plum by means of a round hole (see Figs. *a* and *b*), and passes into the soil to make the cocoon, under cover of which the winter is passed. The cocoon is made in June and July. A larva with me made its cocoon on June 13th in soil offered to it, while, on the other hand, I had larvæ still in the plums on July 2nd.



PLUMS ATTACKED BY THE PLUM FRUIT SAWFLY.

In the spring of the next year pupation takes place, and the adults appear in due course.

REMEDIAL MEASURES.—(1) In the Continental literature it is suggested that the trees should be sprayed just before the opening of the flower-buds with a liquid which will be distasteful to the sawfly and will prevent egg-laying. Some such sprays are named, but no record is given as to the value of this mode of treatment.

(2) Collect and burn the infested fruits before they fall, so as to prevent a new brood of sawflies. Infested fruit can be recognised by the hole, blocked, it may be, with adhering excrement or a drop of gum.

(3) Shake infested fruits off the higher trees—they fall easily—and collect and burn them.

(4) Collect at once and burn any fruits that have fallen and are lying under the trees, before the larvæ leave them.

(5) As the cocoons lie in the soil from summer to the next year the soil below trees that were infested should be dug and worked, the turned-up layers being beaten.

During the month of July a large number of complaints reached the Board that the oat crop was suffering from some insect attack. The letters came from

**Notes on Insect and
other Fungus Pests.**

most parts of the country, but in only a few cases were specimens sent to the Board. Those that were in sufficiently good condition to admit of satisfactory examination were found to be affected with the maggots of the Frit Fly (*Oscinis frit*) or the Stem Eelworm (*Tylenchus devastatrix*), the former predominating. The description of the infestation was in most cases the same. The affected plants were said to be doing well till the middle or end of June, when they ceased to grow, and remained stunted, while other oats in the immediate neighbourhood appeared to be flourishing and growing in the usual way. Many of the correspondents had themselves examined the plants and discovered the maggot that caused the injury. The Frit Fly has clearly been very abundant during the present year, and the Crop Estimators of the Board have commented on the loss sustained in many districts when making their reports. It is well known that the best means of combating the Frit Fly, which appears in great numbers from time to time, is to sow early in the year in order that the plants may make substantial progress before the issue of the April and May brood of flies. The present year offers an excellent opportunity for securing fuller statistical information on the effects of early or late sowing, as well as on the varieties of oats attacked. The Board are therefore engaged in an inquiry on these points, and would welcome the assistance of any farmer whose crops have been seriously affected this year. A schedule of questions has been prepared, and can be obtained from the offices of the Board. It is hoped that the information obtained from the replies to these questions

will enable the Board to describe with greater accuracy the effects of early and late sowing. (See also Leaflet No. 202.)

A specimen of barley sent up from Somerset at the same time as the oats was found to be attacked by the Gout Fly (*Chlorops tæniopus*), and some wheat plants sent from Fifeshire showed the presence of the Wheat Bulb Fly (*Hylemyia coarctata*), which is a well-known enemy of wheat in Forfarshire. The damage in the latter case is done by a maggot that gnaws away the plant tissue, so that the conduction of sap is impossible, and the plants suffer in consequence. A complete life history of the fly and its various generations is still wanting, but it is probable that the new generations of flies in June and July lay their eggs on some gramineous crop, and that the flies from the second generation issue in time to attack the winter wheat. There appears to be no record of *Hylemyia coarctata* attacking barley or oats. When the crop is infested the maggots, feeding inside the plant, cannot be reached, and apart from a stimulating dressing that might help the plant to "grow away" from the pest, the only practicable measure is to plough in the spoilt plants so deeply that it will be impossible for the pest to come to the surface. Mangolds forwarded to the Board from the north of Hampshire showed signs of an attack of the Pigmy Mangold Beetle (*Atomaria linearis*), a pest which was very prevalent last year. These beetles, which do great damage to the crop, are found in most parts of the country, but owing to their small size they are often not noticed. As their life history is imperfectly known, recommendations for treatment are difficult. Thick sowing has been recommended, and also steeping the seed in turpentine or paraffin; but when the attack is obvious, it is too late for remedial treatment.

A number of letters continue to reach the Board dealing with the prevalence of Beech Coccus in England. Two specimens of supposed Coccus sent to the Board during July proved to be the aphid known as *Phyllaphis fagi*. In one case sent from Shrewsbury, a beech hedge 150 feet long and 12 feet high was covered with the aphides, which kept to the underside of the leaves, except the winged specimens, which took to flight as soon as the hedge was touched, thus rendering spraying very difficult. The other case, from Camberley in

Surrey, was also on a beech hedge. Several reports of the prevalence of larch aphides were received, and this pest will be dealt with in a subsequent number of the *Journal*.

As might be expected, several cases of Sawfly attack have been brought to the notice of the Board. In June plums infested with the larvæ of the Plum Sawfly (*Hoplocampa fulvicornis*, Klug.), were sent from places in Huntingdonshire. The infested fruit had fallen by the 18th June. About the same time a correspondent from Worcester sent some larvæ of this pest gathered under his plum trees in that town. In a letter sent with the specimens he said, "The grubs are causing plums to fall off to an alarming extent in my plum plantation of 400 trees. I should think that quite half of the plums on some of the trees have fallen, most notable being the Early Prolifics." On 28th June a number of spoilt plums, taken from a Victoria plum, some of them containing the larva, were received from Sinnington, York. Concerning these the writer said, "The tree, a standard, is bearing a good crop; quite one half of the plums were affected. The pest has not been previously seen in this district." There is no doubt, however, that this pest has been present in many parts of England for a long time, and has repeatedly caused great damage. An article on the life history of the Sawfly is given on page 385. Apples followed out by the Apple Sawfly (*Hoplocampa testudinea*) have been sent from Stockport and Wisbech. This pest is very common (see Leaflet No. 205). The Raspberry Beetle (*Byturus tomentosus*) was reported from Blackheath.

A bad attack of White Root Rot (*Rosellinia necatrix*), which, it will be remembered, is scheduled under the Destructive Insects and Pests Order of 1908, was reported to the Board in the spring from a nursery in Middlesex. The trees affected were cherries, and had been in the ground two years, having been budded last summer. About eight rods of stocks were planted, and about 30 per cent. of these were attacked, but not systematically so. The trees that showed disease were distributed throughout the plantation in an apparently haphazard fashion. Those that were affected were burnt, and it was suggested that sulphur should be hoed in between the remaining trees and all weeds burnt. The stocks were brought from France, but the disease appears to have

been present in the nursery for some years, and there is no clue as to its source. Two growers forwarded specimens of tomatoes, which were found to be badly affected with *Phytophthora infestans*. One writer from Cheshunt says, "We are tomato growers for market, and have had considerable losses from the fruit rotting on the plants. This is the second year we have been troubled this way." The other writer, from Ballantrae, said in his letter dated the 11th June, "The disease was first noticed about a fortnight ago, but no attention was paid to it, as it was not considered dangerous. Now it threatens to destroy about 130 plants in one house, and is beginning to appear on about 120 plants in another. It generally attacks the leaves first, then the stem, and afterwards the fruit." (See *Journal*, November, 1907, p. 481.)

Tomatoes sent to the Board from Redbourn, Herts, were affected with Tomato Leaf Rust (*Cladosporium fulvum*), a disease which is often destructive, and specially so where plants are grown under glass. The writer had been spraying every other day with potassium sulphide, but without complete success. Silver Leaf was reported to the Board from Milverton, in Somerset, and Sowton, near Exeter. The disease is said to be prevalent in this district. A writer from Southend supplied a specimen of Shot Hole Fungus (*Cercospora circumcissa*), which had attacked his six Victoria plum trees to a fairly large extent. Violet Root Rot on pansy shoots was reported from Wirksworth, and on potatoes at Ashton, near Chester. The affected plot in the latter case was some 50 square yards in area.

The Board have also received a number of reports of suspected Isle of Wight Bee Disease from Surrey, Buckinghamshire, Hampshire, and elsewhere. Several of the cases were confirmed, but in many others no confirmation was possible. The matter is still under investigation.

The Board have received from the British Vice-Consul at Nuremberg (Mr. S. Ehrenbacher), through the Foreign Office, a summary of the annual report of the Middle-Franconian Chamber of Commerce at Nuremberg on the hop trade of Bavaria. A note on this subject appeared in the *Journal* for April last (p. 36).

**Hop Trade of
Bavaria.**
"

The Report states that the world's crop in 1908 may be reckoned as one of the most abundant of the last decade. England had a large yield, and practically all other hop-growing countries had larger crops than in 1907, except America, where the crop was about 200,000 cwts. short of that of the previous year.

Under the pressure of this large growth and the considerable stocks remaining from the previous year, prices ruled lower in 1908. From September up to the end of February prices dropped continuously. During September and October, when it became apparent that in spite of an abundant crop there were very few choice hops, there was a demand on the Nuremberg market and in the Bavarian districts of production, for good coloured, green, and sound hops, and for such qualities proportionately very good prices were paid.

As soon as these good qualities were bought up things became very quiet everywhere, and even the prices of fine qualities which had mostly passed into the hands of the trade declined. Owing to the demand for export to England (mostly good medium qualities), business about the middle of November became more active, but prices did not improve. Best qualities fairly maintained their value, and medium qualities were still saleable, but for common hops, even at the low price of 15s. to 20s. per cwt., only a few purchasers were to be found, and everywhere the stocks of these remain unsold.

The yield of the crop in Germany and other countries is estimated as follows in thousands of cwts.:—

	1907.	1908.
Bavaria	266	295
Wurtemberg	61	69
Baden	31	37
Alsace	88	98
North Germany	18	20
Germany—total	464	519
Austria	306	325
Russia	69	78
Belgium and Holland	49	83
France	78	78
England	373	588
America	609	393
Australia	15	15
World's crop	1,963	2,079

It is estimated that on 1st September, 1909, a stock of

about 226,000 cwts. will remain in the hands of the brewers, the trade, and the growers. In all hop-growing and beer-producing countries the hop-stocks are considerably larger than in former years, in consequence of two consecutive years with heavy crops, accompanied by a decrease in the consumption of beer in all countries. The export to England and Belgium has slightly increased, but to all other countries, especially to the United States of America, it has decreased. Although in some countries a reduction in the acreage has taken place, in others, especially Austria, a remarkable increase is to be noted. A considerable reduction of the acreage of hop land under cultivation has taken place in Germany in recent years. The Report recommends further reduction of the acreage, especially in districts where unfavourable conditions of production exist.

In Austria it has been considered that the position of growers would be improved by the introduction of a law as to origin. This idea arose from the belief that thereby the prices of certain varieties, such as Saaz, would be increased. In Germany also the idea seems to be prevalent in several interested quarters that a law as to origin would improve the present state of the industry. But the consumer is now less inclined than ever before to attach importance to origin, but lays stress principally on a well cured, well picked, good coloured article. These, and not the origin, are the qualifications which mainly determine the value of the goods.

The Report considers it clearly proved that the state of the hop-growing industry cannot be improved by laws as to origin nor by protective tariffs. An improvement can only take place if the growing of hops is discontinued in districts not suitable for their cultivation, of which there are many in Germany, while at the same time growers reduce their acreage by at least one fourth. It is not essential to grow first-class hops everywhere, for there are districts that can be worked more economically for the production of lower qualities. But, wherever hops are grown, close attention should be paid to sorting, picking, and curing, for these three points materially influence the value. It is suggested also that Bavarian growers should endeavour to grow early sorts, as they stand a better chance of being harvested in good condition.

The year 1908 was an unfavourable one not only for the growers but also for the merchants, and the Report refers to the depression prevailing in the brewing trade in Germany, which naturally has an unfavourable effect on the hop industry. The prospects for 1909 are, therefore, regarded as unsatisfactory.

The action taken by the Board of Agriculture and Fisheries during 1908 under the Diseases of Animals Acts is described in the Annual Reports [Cd. 4592.

**Report on Diseases
of Animals.**

Price 1s.] prepared by the Chief Veterinary Officer (Mr. S. Stockman) and by the Assistant Secretary (Mr. A. W.

Anstruther, C.B.).

Mr. Stockman's report, which deals with the experiments and investigations which have been conducted in connection with various diseases, refers to the circumstances attending the outbreak of foot-and-mouth disease in Edinburgh in February, 1908. In connection with this outbreak, an interesting and important point was raised as to the length of time the virus of the disease could remain infective.

The only material upon which suspicion rested as the source of the disease was a small consignment of hay imported from Holland. This hay was brought into contact with the animals of the first outbreak on January 29th. Four days afterwards one animal was observed to be ailing, and on the sixth day after the hay was introduced 30 to 40 showed unmistakeable symptoms of Foot-and-Mouth Disease—that is to say, within the recognised incubative period of the disease. Admitting that infection was imported in the hay, Mr. Stockman remarks that the above circumstances must alter the generally accepted ideas regarding the time that the virus of Foot-and-Mouth Disease may retain its virulence in practice.

It has been generally observed that new animals may be put in association with others which have recovered from the disease after two or three weeks, and that it is only exceptionally that the former contract Foot-and-Mouth Disease. Experimentally it has been found that the virus becomes inactive if dried in sunlight during twenty-four hours. It has also been observed, however, that if pure lymph be kept in the ice chest and away from the sunlight—that is to say,

under experimental conditions—it may retain its virulence for three or four months.

It would appear from the experience in the Edinburgh outbreak, that the conditions necessary for the long unkeep of virulence may be found inside a bale of hay during the cool season of the year. The hay in question had been imported fully two and a half months before it was brought in contact with the animals which developed the disease, and assuming that it was contaminated on the farm of origin, of which, however, there was no evidence, the virus might in such case be held to have remained active for at least three and a half months. It had certainly retained its virulence for two and a half months, since it had during that period been beyond all sources of possible contamination.

Mr. Stockman's investigations into the disease known as Red-water, which are described in his Report, are summarised on page 395 of this *Journal*.

Mr Anstruther's Report deals with the administrative work carried out under the Acts, which was unusually heavy during the year.

As regards Swine Fever, it is observed that although the record for the year 1908 is in some respects a disappointing one, there seems reason to believe that the recent recrudescence of the disease has now been checked, and that a general improvement in the position may be looked for in 1909.

The position as regards Sheep Scab at the end of 1908 was by no means unfavourable, and it appeared that progress was being made towards its ultimate eradication, although that goal was not yet in sight. Experience is year by year being gained, and the professional questions arising in connection with the disease and its behaviour in the field are receiving the closest attention. The fact that the disease dies down annually in the summer months only to rise again to a greater or less extent on the approach of winter, raises questions which still require careful investigation, and it may only, perhaps, be when the reason for this annual decline is more clearly understood that the final extinction of the disease will be secured.

A new Order relating to Glanders came into operation at the beginning of the year. This Order aims at the complete

eradication of the disease in Great Britain, and with this object in view, provision is made for the destruction not only of horses, asses, and mules which show clinical symptoms of Glanders or Farcy, but also of those in which the application of the mallein test has resulted in definite evidence of disease. It is hoped that by this means the destruction of animals which are suffering from the disease in a latent form, although no outward symptoms are apparent, will be rapidly secured. The Returns for 1908 are regarded on the whole as very reassuring, and in the case of London, the progress which has been made towards the eradication of the disease is very satisfactory.

There was a slight increase in the number of reported cases of Anthrax.

In November, 1908, Foot-and-Mouth Disease was detected in the United States of America, and an account is given of the precautions which were taken to guard against the risk of the introduction of the disease into this country by means of animals or of hay or straw brought from America.

The Chief Veterinary Officer of the Board of Agriculture and Fisheries (Mr. Stewart Stockman) refers in his Annual Report for 1908 to the investigations into Texas-fever, which it is believed will have an important bearing on the export trade in pedigree cattle. In connection therewith the disease known as Red-water has also been investigated.

Mr. Stockman states that, in collaboration with the Veterinary Departments of the Transvaal and the East Africa Protectorate, 43 heifers and bulls have been inoculated at the laboratory against Texas-fever, now more generally called *Piroplasmosis Bovis*. The animals are shipped after inoculation to the above Colonies, where they are pastured on farms badly infected with Texas-fever, in order to test the practical value of the immunity conferred in England by artificial methods.

The initial expense of importing pedigree cattle into Africa from Great Britain is considerable on account of the freight

alone, but importation is almost prohibited when they have to be maintained and fed perpetually in separate stables, or exposed to the risk of a loss of from 50 to 90 per cent. consequent on putting them on the pastures with indigenous cattle. It is too soon to report definitely on the results of the exposure tests on the African pastures, as the experimental exportations are still going on, but it is probable that if these trials turn out successfully, one of the results will be an increased export trade in pedigree cattle.

In consequence of the presence of these and other cattle at the laboratory, it was possible to carry out an investigation into Red-water in England.

Earlier Investigations into Texas-fever.—In 1888 Smith and Kilbourne, working in America, showed that Texas-fever was due to small parasites (hæmatozoa) invading the red cells of the blood, and in 1893 the same authors demonstrated that the blood of animals sick or recovered from the disease would cause Texas-fever in healthy animals if inoculated. It was known that sick animals did not infect healthy ones by mere cohabitation, and it was proved by Smith and Kilbourne that female ticks which had sucked on affected or recovered cattle produced a progeny of young ticks which conveyed the disease. The length of time during which the blood of recovered animals remains infective, and therefore capable of infecting ticks, varies considerably, but in the case of tropical piroplasmosis, it may remain potentially infective for several years.

Similarity between Texas-fever and Red-water.—Since 1901 it has been known, as the result of an observation made by the late Prof. Nocard, that parasites, morphologically identical with those found in connection with Texas-fever, may be found in the red blood corpuscles of animals suffering from the disease known as Red-water in Great Britain. Working in collaboration with Sir John Macfadyean, Mr. Stockman has shown, as the result of experiments performed at the Board's laboratory, that the blood of animals suffering or recovered from English Red-water is capable of infecting other susceptible cattle with the disease after an incubation period of from six to ten days.

It has been established that Red-water in England coin-

cides with the tropical piroplasmosis in being inoculable, the only difference in this respect which could be discovered being that the blood of animals recovered from English Red-water did not appear to be potentially infective for so long a time as in the case of the tropical form of the disease. This difference, however, cannot be looked upon as very material, although it is important enough in considering measures of prevention in relation to the former.

Transmission of the Disease by Ticks.—Having established the inoculability of the English disease, the natural method of infection had to be inquired into, because, as in the case of Texas-fever, cattle affected with Red-water may stand alongside healthy animals without transmitting the infection. Naturally, the probability of the English disease being tick-borne suggested itself, and this involved an inquiry into the distribution of ticks in Great Britain, the life-history of the varieties of ticks found on Red-water farms, and the seasons of the year during which they are most prevalent. This part of the inquiry is not yet completed, but a great deal of information on the subject has been obtained.

Only two varieties of ticks, the *Ixodes ricinus* and the *Hæmaphysalis punctata*, with a similar life-history, have been collected from cattle and sheep in the field, and both varieties have in certain cases been obtained from farms where Red-water is known to exist. It seems practically certain that both are capable of carrying the parasites which cause Red-water, although experimental proof has up to date only been obtained as regards one of them, the *Hæmaphysalis punctata*.

Methods of Infection.—A consideration of the life history of these ticks suggested that they might be infective in several stages, and an investigation was therefore conducted at the laboratory into this point. As a result of this inquiry, which is described in the Report, the conclusion was arrived at that the Red-water of this country is spread under natural conditions from animal to animal by ticks. It must not be thought, however, that the mere presence of ticks on pastures means that cattle put to graze thereon will contract Red-water. The ticks of themselves are harmless, and remain so until they have fed upon an animal sick or recovered from piroplasmosis. There are plenty of farms which are infested with ticks, but

which are not Red-water farms. They are, however, capable of becoming Red-water farms if sick or recovered animals are put to graze upon them, and it has already been mentioned that the blood of recovered animals may retain its virulence and therefore be capable of infecting ticks for a considerable time (several months, and, in the case of tropical piroplasmosis, several years).

A few experiments have been made for the purpose of discovering whether British ticks are capable of carrying the tropical and more fatal form of Red-water, and this was found to be the case, though the experiments are not yet concluded.

Seasonal Appearance of Red-water.—In this country Red-water is most prevalent from March to June and during October and November, and these periods of the year correspond with the time of the greatest prevalence of ticks, particularly the adult forms, according to field and laboratory observations. Outside these periods odd cases of the disease are met with, the reason being that although the periods mentioned are those at which the dangerous stages of the tick are most prevalent, they do not all accomplish the moult at the same time; some are earlier and some are later.

Prevention of Red-water.—As the result of all these investigations, a certain amount of advice under the head of prevention may be given as regards English Red-water.

The owner of a Red-water farm may attempt to reduce his losses, or even to eradicate the disease, in one of three ways :—(1) He may resort to inoculation, and for this purpose the blood of an animal about a month recovered from the disease should be used. If susceptible animals are inoculated with an appropriate dose of infective blood, they develop an attack of the disease of varying intensity, and after recovery they exhibit a high degree of resistance to natural infection. The inoculated animals should be kept indoors during the process of immunisation (for about a fortnight to three weeks), so that they can be attended to in the event of a severe attack being induced. Under such circumstances accidents should be very infrequent.

Animals bred and reared on Red-water farms are usually highly immune, owing to an attack of the disease contracted

in the early stages of their life. Young animals suffer much less acutely than older animals from an attack, and one must be very careful indeed in inoculating bovines above eighteen months of age.

It will seldom be necessary to inoculate animals reared on the infected farms, and the operation will be almost entirely confined to those bought in from non-Red-water districts or farms. One great objection to the inoculation method is that the inoculated animals are capable of keeping up the infection in the ticks on the pastures, but there are certain pastures, the nature of which makes it practically impossible to combat the disease by any other method.

(2) If the farm is heavily infested with ticks, which is somewhat rare in this country, an attempt may be made to reduce their numbers by dipping the animals while the parasites are attached to them. For this purpose it is best to put a large number of sheep on the pastures as tick collectors. There are, however, various objections to the dipping method. In order to catch the greatest number of ticks, the animals have to be dipped more frequently than is convenient or safe (once every ten days).

Close observation shows that none of the dipping materials commonly used have a particularly destructive effect on ticks, nor can they be relied upon to keep ticks off the animal for any appreciable time. It might be mentioned here that dips for the destruction of ticks have acquired a reputation quite in excess of their value owing to the fact that the British ticks, in order to complete their development, naturally drop off their host in a few days, and the dip often gets the credit of having destroyed them, or of having made them let go their hold. If engorged female ticks be collected from animals which have been dipped, it will be found that a large number of them remain alive for a long time, and lay their eggs in spite of the dipping.

Mr. Stockman is of opinion, however, that continued dipping, even though it be unlikely to bring about the eradication of ticks, must be held to reduce their numbers, especially if one dips frequently and chooses for the dipping periods the seasons March-June and October-November, when the impregnated adults are most prevalent. The best results,

such as they are, have been obtained with arsenical and paraffin dips.

(3) Without destroying the ticks, the infected ones may be eradicated from the pastures by keeping cattle off for a time, and this method is the one which promises most finality. The period, however, is a long one, as the various stages of the tick are capable of a prolonged existence in the event of no host being available. Probably the cattle would have to be kept off for about 14 months to ensure purification. The cleansing of the ticks may be hastened, however, by heavily stocking the pastures with sheep. The latter animals are not susceptible to Red-water, and the infected ticks harmlessly inject their virus into them. If it be not possible to utilise the infected pastures for sheep alone, the number of cases of Red-water in cattle can be greatly reduced by running sheep on the pastures as well as bovines, many of the infected ticks will then go on to the sheep, and in this way be diverted from their bovine hosts.

A few observations on the value of pasturing sheep with cattle on Red-water land are being now made by the advice of the Board and the results so far are encouraging.

The Report of the Intelligence Division of the Board for the year ending December 31, 1908, which deals with the work accomplished by the Commercial Control Branch has now been issued. [Part I., Cd. 4688. Price 5½d.]

**Report of the
Commercial Control
Branch.**

The Commercial Control Branch was established early in the year, and undertakes inquiries and correspondence as to the administration of the Sale of Food and Drugs Acts, 1875 to 1907; complaints relating to adulteration of articles of food affecting the interests of agriculture; the administration of the Fertilisers and Feeding Stuffs Act, 1906; prosecutions under the Merchandise Marks (Prosecutions) Act, 1894; and complaints as to rates and facilities for the carriage of agricultural produce by rail.

The Report describes the numerous cases which were dealt with during the year with a view to the prevention of fraud or misdescription. In many instances prosecutions were

instituted, and in others where no proceedings were taken, the result was none the less satisfactory in view of the fact that the intervention of the Board leads in most cases to a discontinuance of the practices complained of, and ensures the more complete enforcement of the laws.

One series of cases of considerable importance related to the adulteration of pollards with artificial shudes.

Early in the year the Board received a communication from an Association of millers in Scotland relating to an offer made by a Liverpool trader to sell to one of their number shudes at 50s. per ton. The trader stated that this article was extensively used for mixing with pollards, and it was suggested by the Association that the offer and statement amounted to an incitement to commit a misdemeanour.

Inquiry was made, but no evidence of this offence could be found. The Board accordingly suggested to certain Official Samplers that they should test articles supplied by the trader in question. Samples of the article in question were forwarded to the Government Laboratory, and the Principal Chemist reported that the samples consisted of finely-ground gypsum and fine wood sawdust in approximately equal weights.

With the assistance of the Chief Constable of Leicestershire, the Board then procured sample packets of shudes and pollards from the Liverpool trader. The shudes were found to be the same as those described above, and the two samples of pollards were found to contain 18 to 22 per cent. respectively of gypsum. The Board directed that proceedings should be taken under the Merchandise Marks Act in respect of the samples of pollards, but were advised that it was doubtful if a prosecution under these Acts in respect of a sample packet would be successful.

They then instructed one of their Inspectors to purchase a small quantity of pollards at the premises of the Liverpool trader. This purchase was analysed and found to be genuine.

As it was evident that an extensive and fraudulent trade was being carried on, and that the trader was on his guard against the purchase of small samples, the Board, with the assistance of the Chief Constable of Leicestershire, procured a consignment of a ton of pollards to be delivered at premises in Leicestershire. Samples of this consignment were analysed

and found to contain considerable quantities of gypsum, but as the circumstances in which the samples were obtained were such that proceedings could be instituted under the Fertilisers and Feeding Stuffs Act, it was thought better to rely on that Act instead of proceeding under the Merchandise Marks Acts. Further consignments were found to contain 20 per cent. and 15 per cent. of gypsum, respectively. Proceedings were instituted against the trader for having sold for use as food for cattle an article to which there had been added an ingredient worthless for feeding purposes, and not disclosed at the time of sale. He was convicted, and fined £10 and £6 6s. costs in each of the two cases.

A similar case occurred in Berkshire where the Official Sampler obtained a sample which was found to consist of about equal parts of finely-ground sawdust and finely-powdered gypsum. The mixture bore some resemblance to shudes, as the sawdust represented the ground husk, and the gypsum took the place of the impalpable powder found in shudes. Proceedings were instituted against the seller for giving a false invoice and for selling as food for cattle an article which contained a deleterious ingredient. The defendant was fined £20 on each summons, with costs amounting to £24. Two prosecutions on the same lines were instituted in Bucks, and the seller was fined £25 in respect of each consignment, and £7 3s. 3d. costs. A sample of shude meal, sold by a trader to a miller in Bucks, was also found to be a mixture of gypsum and sawdust. The trader was fined £25 and £11 14s. 6d. costs.

Cases of sharps containing 25 per cent. of gypsum and of maize germ meal adulterated with 31 per cent. of chalk also occurred during the year.

Several conferences were held with railway companies, and a number of complaints as to railway rates were brought to their notice with satisfactory results.

SUMMARY OF AGRICULTURAL EXPERIMENTS.

EXPERIMENTS WITH POTATOES (*continued*).

Manuring of Potatoes (*Journal of Royal Agricultural Society*, Vol. 69, 1908).—An experiment was made in 1908 to compare the action of "nitrolim," or calcium cyanamide, with sulphate of ammonia, and with

nitrate of soda. In consequence of the striking results obtained at the Pot-culture Station in regard to the influence of magnesia, it was resolved to try its effects also in the field.

The variety of potato grown was "Table Talk," and six different plots were manured alike with a general dressing comprised of, per acre: farmyard manure, 12 tons; superphosphate, 3 cwts.; and sulphate of potash, 1 cwt.

In addition to this general manuring, three plots (Nos. 1, 2, and 3) had further nitrogenous applications in the respective forms of sulphate of ammonia, nitrate of soda, and calcium cyanamide. The basis of comparison was 1 cwt. per acre of sulphate of ammonia, the amounts of nitrate of soda (142 lb. per acre) and calcium cyanamide (128 lb. per acre) applied containing the same amount of nitrogen as did the 1 cwt. of sulphate of ammonia.

Plot 4 received the general dressing only, while plots 5 and 6 received, in addition, 3 cwts. and 6 cwts. per acre of ground magnesia.

The lowest produce was with the standard dressing only. Of the three different nitrogenous applications, decidedly the best was sulphate of ammonia, the extra nitrogen supplied in this increasing the crop by 1 ton 12 cwts. per acre; nitrate of soda, giving the same nitrogen, improved the yield by 1 ton 2 cwts., and calcium cyanamide by 8 cwts. 2 qrs. only. The superiority of sulphate of ammonia to nitrate of soda for the potato crop, so far at least as the Woburn soil is concerned, has been shown before, and it now appears hardly likely that calcium cyanamide will prove as good as either, presuming its nitrogen to cost the same as that in sulphate of ammonia.

The results obtained from the use of magnesia are very remarkable; 3 cwts. of magnesia per acre increased the crop by 13 cwts., although no more nitrogen was used, and 6 cwts. per acre of magnesia gave no less an increase than 1 ton 5 cwts., the crop being the second largest one of the whole series. Thus 3 cwts. per acre of magnesia showed itself superior to 1 cwt. of calcium cyanamide, and 6 cwts. of magnesia per acre acted better than did 1½ cwts. of nitrate of soda. The results obtained with magnesia will be further tested.

Planting Potatoes (Lancs. C.C., Agricultural Department, Bulletin No. 10).—This Bulletin gives the results of the experiments with seed potatoes which have been carried on for the four years 1905-8. The two points investigated were the effect of change of seed, and the benefits of boxing and sprouting.

The conclusions arrived at are as follows:—

1.—Seed potatoes brought from a northern to a southern latitude give a much larger crop than do those brought from a southern to a northern latitude.

2.—The yield from Irish-grown seed sprouted, though highly satisfactory, is, on the average, below that from the Scottish-grown seed sprouted. It is evident, however, that Ireland may become, in the near future, a strong competitor with Scotland as a source of seed potatoes for Lancashire, especially if the respective costs of transit are taken into consideration.

3.—Seed potatoes obtained from localities within the county fail on the average to produce crops as large as those obtained from Scottish- or Irish-grown seed.

4.—Seed potatoes obtained early in the year and sprouted before being planted give a larger yield than those obtained late and planted direct (i.e., unsprouted) from bags. It is important to keep the first formed sprouts, as they are the strongest, and appear above ground in the shortest possible time, thus allowing a longer season of growth.

5.—The increased yield from seed bought early in the year will repay the extra labour incurred by its early arrival upon the farm, and will at the same time allow of a substantial profit, as, on the average, the crop is increased by more than two tons of large tubers per acre by the use of sprouted seed.

*Planting Potatoes (Aberdeen College of Agriculture, Leaflet No. 6).—*This leaflet gives the results of field trials carried out on a large number of farms during the four years 1905–8 for the purpose of ascertaining the effect of sprouting seed potatoes in boxes before planting. In 1905, the average gain by sprouting was 1 ton 18 cwts., in 1906 it was 1 ton 9 cwts., in 1907 it was 2 tons, and in 1908 it was 2 tons 4 cwts. The average percentage of small and diseased potatoes was also less with the sprouting system, and it may fairly be assumed that the practice is one which will prove profitable in the majority of cases. The method is described in the Board's Leaflet, No. 173.

*Planting Potatoes (Edinburgh College of Agriculture, Bulletin 17).—*The experiments reported in this Bulletin as regards the manuring and the selection of varieties of potatoes have been summarised in this *Journal* (July, 1909, pp. 314 and 316). Another point dealt with was the advantage of cut as compared with whole sets. Six tests were made with three varieties, the sets being of equal weight and number. In every case the cut sets yielded a smaller proportion of undersized tubers than the whole sets, and in five cases cutting the large sets gave more ware up to 50 cwts. per acre. The total crop, however, was sometimes greater and sometimes smaller with the cut sets.

Another experiment dealt with the size of the seed. It is usual to dress the ware over $1\frac{1}{8}$ -in. riddles, and then dress for seed what is left by means of $1\frac{1}{2}$ -in. riddles. Many of the sets obtained in this way are found to weigh about 1 oz. This trial, therefore, was undertaken to ascertain whether it would be an improvement to use slightly larger sets. The method adopted was to take seed dressed with the $1\frac{1}{8}$ -in. riddle, and to divide it into "tops" and "tails" by means of a $1\frac{1}{2}$ -in. riddle. This was done with four varieties, and in every case the "tops" gave the greater yield, the increase varying from about 5 cwts. up to 30 cwts. per acre, the average amounting to about 17 cwts. This point will be subjected to further trial, but the results so far indicate that the $1\frac{1}{2}$ -in. riddle is on the small side, and that the use of one, say, $1\frac{3}{8}$ in., or $1\frac{1}{2}$ in., would be an improvement.

Considerable diversity of opinion exists amongst potato-growers as to the most profitable distance apart to plant sets in the rows. Three trials were undertaken to test this, the distances being 12 in., 14 in., 16 in., and 18 in. The largest crop was in each case obtained by planting at 12 in. apart, there being a gradual falling off in yield as the distance widened.

*Planting Potatoes (Herts. C.C. Leaflets 6 and 7).—*The experiments as regards manuring and varieties recorded in these leaflets have been summarised in this *Journal* (July, 1909, pp. 313 and 315).

The planting of large tubers results in a very much greater proportion of seed potatoes than if ordinary seed is used. In two trials which were undertaken to ascertain the difference, a yield of 2 tons 9 cwts., and 3 tons 7 cwts. of seed potatoes, were obtained when large tubers were planted, as against 16 cwts. and 17 cwts, respectively when seed was planted. The variation in the total crop was not great. It will be seen, therefore, that when growing for seed, the use of large tubers is profitable, but if practised when growing for market, it would result in a distinct loss. The weight of large tubers planted was $31\frac{1}{2}$ cwts. per acre, against 15 and $17\frac{1}{2}$ cwts. of seed.

The results of some experiments to test the effect of change of seed are recorded, and also some comparing Irish with Scotch seed. The Irish seed gave better results than the Scotch seed in each case.

MISCELLANEOUS MANURIAL EXPERIMENTS.

Rotation Experiment (Journal Royal Agricultural Society, Vol. 69, 1908).—The object of this experiment, which is still being carried on, is to see what increase of crops during the rotation is obtainable from the use of decorticated cotton cake as compared with maize meal, or from either as compared with no cake or corn; in other words, to ascertain what is the unexhausted manurial value of these foods, according as they may be, in the one case, fed direct on the land by sheep, or, in the other case, used by bullocks in feeding boxes for the production of farmyard manure. The results are given for 1908.

Rotation Experiment (Aberdeen College of Agriculture, Bulletin No. 10).—In view of the importance of determining the residual value of manures, a number of rotation experiments have been arranged in the northern counties, and the figures relating to one which has been in operation for three years are given in this report. This experiment is designed to ascertain the residual value of the ordinary phosphatic manures. There are nine plots, each $\frac{1}{2}$ acre in extent, and the first four plots received a standard dressing of 20 lb. nitrogen, 100 lb. phosphoric acid, and 40 lb. potash per acre, but on each plot the phosphoric acid is derived from a different source. Plot 5 is unmanured, and plots 6-9 are dunged at the rate of 10 tons per acre, and receive just half the quantities of fertilisers applied to the first four plots. The last four plots are, therefore, duplicates of the first four, with the difference that half the artificial manure is omitted and replaced by the dung. The phosphates used were superphosphate, basic slag, bone meal, and ground Florida phosphate.

The rotation during the three years has been turnips, barley, hay, and, by deducting the cost of the manures applied, the results may be compared with those obtained from the unmanured plot. Taking the first four plots, which received no dung, superphosphate gave a profit of 20s. per acre, basic slag 17s. 3d., and ground Florida phosphate, 5s. 9d. The application of bone meal has up to now resulted in a loss of 27s. 3d. per acre. This is due to the fact that the plot receiving bone meal produced a much poorer crop of barley than any of the other plots, and less also than the unmanured plot.

When the manures were applied with dung, they have all left a profit, by far the largest being from the Florida phosphate. The plot receiving

this fertiliser produced the largest turnip crop, a good barley crop, and distinctly the largest hay crop. The total value of the three crops on this plot was £28 18s. 6d., as compared with the next highest result of £26 17s. 6d. per acre from the superphosphate plot.

Green Manuring (*Journal of the Royal Agricultural Society*, Vol. 69, 1908).—Experiments in green manuring have been carried on for a number of years at Woburn, and mustard ploughed in has always given a better corn crop than tares. As explained in this *Journal* (December, 1908, p. 708), investigations have shown this to be due to the alteration produced in the physical condition of the soil.

The experiments in 1908 fully confirmed the observations of previous years, and showed that on this soil wheat following rape and mustard ploughed in gave the best crops, while the smallest crops were obtained from wheat following tares. The plots which received lime in 1904 were generally superior to the corresponding ones to which mineral manures had been applied.

Calcium Cyanamide (*Journal of the Royal Agricultural Society*, Vol. 69, 1908).—A comparison was made between sulphate of ammonia at the rate of $\frac{1}{2}$ cwt. per acre, applied as a top-dressing to barley, and 96·3 lb. of calcium cyanamide, which was found to supply the same amount of nitrogen. The results were greatly in favour of calcium cyanamide. It is pointed out, however, that the Woburn soil is decidedly deficient in lime, and is liable to suffer some ill effects from sulphate of ammonia. Calcium cyanamide contains a material quantity of lime, and to this fact is to be attributed in large measure the better crop obtained with the new material.

Calcium Cyanamide and Nitrate of Lime (*Transactions of the Highland and Agricultural Society*, Fifth Series, Vol. XXI., 1909).—Mr. James Hendrick, Chemist to the Society, gives some information as to the new nitrogenous manures, nitrate of lime and calcium cyanamide, and states that the general result of experiments carried out in Scotland has been to show that calcium cyanamide is capable of giving as great an increase in cereal crops as the better-known manures, and that there is little difference, weight for weight of nitrogen, between it and nitrate of soda or sulphate of ammonia.

With turnips, the results obtained on the average from calcium cyanamide were not as good as those obtained from the application of an equal amount of nitrogen in the form of sulphate of ammonia.

With regard to the question of the possibility of calcium cyanamide in its crude state proving injurious to germinating seeds, this point was tested by Mr. Hendrick in two years by applying the fertiliser to one plot ten to twenty days before seeding, and to another plot with the seed. On the average, no difference was observed. The germination did not appear to be affected, and the cyanamide appeared to undergo change rapidly enough in the soil to be available for the crop, even when it was sown at the same time as the seed.

Nitrate of lime has, on the average, given rather better results than those given by nitrate of soda supplying an equal weight of nitrogen. This is probably due to the presence of the lime. Mr. Hendrick states that it was noticed again and again in the field experiments that when the plots which had received equal amounts of nitrogen in the different forms of nitrate of soda, sulphate of ammonia, cyanamide, and nitrate

of lime were viewed side by side, the plot which had received nitrate of lime looked darkest in colour and most vigorous in growth. This appearance was confirmed when the crops were weighed.

FOREIGN AND COLONIAL EXPERIMENTS.

Manuring of Barley (Deutsche Land. Presse, Nos. 27 and 28, 1909).—In these publications, Prof. Julius Stoklasa, Director of the Chemical Experimental Station at Prague, gives the result of some recent investigations into the manuring of barley for brewing purposes.

He shows that the food requirements of the plant vary very considerably during its period of growth, and are at their maximum during the second month. The quantities of nitrogen, phosphoric acid, and potash assimilated per acre are given as follows :—

		During 30 days of growth.	During 60 days of growth.	During 90 days of growth.	During 120 days of growth.
		lb.	lb.	lb.	lb.
Nitrogen	...	3·9	76·6	82·1	83·9
Phosphoric acid	...	1·1	19·8	33·9	35·7
Potash	..	3·8	94·6	110·6	114·2

It would seem from this that the bulk of the nitrogen, 55 per cent. of the phosphoric acid, and 83 per cent. of the potash, are taken from the soil during the first sixty days of the plant's growth, from which it may be inferred how important it is that these manurial substances should be present in an easily available form.

Prof. Stoklasa shows also that the assimilative capacity of the roots of barley is less than that of wheat, oats, or rye, though, on the other hand, when there is an absence of food materials in the soil, the roots of barley develop to an abnormal extent, and penetrate downwards into the soil searching for food.

Owing to the short period of growth, the object of the farmer must be to provide the necessary manurial constituents in an available form during the first two months. As will be seen from the above table, potash is required in the largest quantity, then nitrogen, and then phosphoric acid, and when growing barley for brewing purposes these must be given in such a way as not to injure the quality or the capacity for early ripening.

Experiments have shown that the addition of nitrate of soda, superphosphate, and muriate of potash to land which has been well manured with nitrate of soda for the preceding crop of sugar-beet results in a better yield than if phosphates and potash alone had been applied. The following table shows the comparative results :—

Manures applied.	Cwts. per acre.		Per cent.	
	Grain.	Straw.	Starch.	Nitrogen.
1. Unmanured	11·8	16·6	64·5	12·07
2. 180 lb. 40 per cent. muriate of potash, 180 lb. superphosphate (17·5 per cent. soluble)	18·1	20·1	66·8	10·5
3. 180 lb. muriate of potash, 180 lb. superphosphate (17·5 per cent. solu- ble), 90 lb. nitrate of soda (15·6 per cent. nitrogen)... ..	21·2	24·9	66·0	11·0

An increase both in the yield and in the straw was, therefore, obtained by the addition of nitrate of soda to the potash and phosphate, while the variation in the starch and nitrogen content of the barley was not great.

Prof. Stoklasa, therefore, recommends that when barley follows sugar-beet to which nitrate of soda has been given, a moderate dose, say, 90 lb. per acre, of nitrate of soda should be applied. Larger quantities would not be desirable, as the nitrogen content of the barley would be increased.

Cutting of Potato Tubers: Effect of Time of Cutting on Growth (Mitt. der Deutscher Landwirtschafts-Gesell., 1st May, 1909).—Experiments have been conducted at Frankenthal (Palatine) by Herrn J. Osterspey and Renner in 1907 and 1908, to test the effect of cutting the seed on the subsequent crop. The conclusion reached was that the productivity of tubers cut lengthwise is, under suitable conditions, equal to that of middle-sized tubers of the same weights.

On dry soils and during cold weather the cut tubers compared favourably with whole tubers if the cutting took place shortly before planting, so that the tubers did not suffer from a loss of moisture in consequence. On the other hand, the cutting was found to be disadvantageous under similar conditions when it took place eight days before planting.

On wet soils and during warm, damp weather the cutting of the tubers shortly before planting proved disadvantageous, whereas tubers cut eight days and two days before planting were equal to whole tubers both as regards growth and production.

It is considered, therefore, that tubers should be cut two days before planting on damp soils, but in dry weather and when the land is dry it is preferable to cut them immediately before planting. The drying of the potatoes can be diminished by covering them with wet sacks.

Lime-sulphur Wash as a Fungicide (United States Department of Agriculture, Bureau of Plant Industry, Circular No. 27).—During the year 1907 experiments were conducted in the United States with a view to test the value of a lime and sulphur wash as a fungicide and insecticide, and the results were referred to in this *Journal* in October, 1908 (p. 522). It was shown that a specially prepared wash composed of 10 lb. flowers of sulphur and 15 lb. fresh stone lime in 15 gallons of water had given good results against certain fungus diseases.

More extensive experiments were planned and carried out in 1908 in five States (Georgia, Arkansas, Nebraska, Illinois, and New Hampshire) under the supervision of Mr. W. M. Scott, Pathologist in charge of Orchard Spraying Experiments, United States Department of Agriculture.

The solutions were chiefly tested as remedies for peach scab (*Cladosporium carpophilum*, Thüm), brown rot (*Sclerotinia fructigena*, Schröb), cherry leaf-spot (*Cylindrosporium padi*, Karst), and apple scab. The object was to ascertain if these washes could be used with advantage on growing trees without the injury to the foliage which results from applications of Bordeaux mixture.

The following three preparations were tested:—

(1) Home-boiled lime-sulphur wash, composed of 15 lb. sulphur, 20 lb. lime, and 50 gals. water. The lime and sulphur are boiled together

with half the water for 45 minutes, then strained and diluted to 50 gallons. The wash is then ready for use, practically all the sulphur being in solution combined with the lime. For spraying trees in the dormant state, this wash may be substituted for Bordeaux mixture as a fungicide, and it is frequently used for peach-leaf curl. As, however, it is injurious to foliage, it cannot safely be used as a summer spray, unless greatly diluted, and then not effectively on the peach.

(2) A lime-sulphur solution is sold in the United States which is practically a concentrated solution of the same composition as the above. It has been rather extensively tested as a summer spray, but the results have been conflicting.

(3) The self-boiled lime-sulphur mixture, to which these experiments largely refer, is a combination of lime and sulphur boiled with only the heat of slaking lime. It is primarily intended for summer spraying as a substitute for Bordeaux mixture where the latter is likely to be injurious to foliage or fruit. For most purposes, however, Bordeaux mixture is considered to be the better fungicide, and should be used when possible.

The mixture which was found most satisfactory was composed of 10 lb. lime, 10 lb. sulphur, and 50 gals. of water, while 6 lb. sulphur and 6 lb. lime to the same quantity of water also gave good results on peach and cherry trees. It is most suitably prepared in rather large quantities—20 lb. or even 40 lb. at a time—in order to produce sufficient heat to cause violent boiling for a few minutes. The lime should be placed in a barrel, and sufficient water added (3 gals. per 20 lb.) to start the slaking and keep the sulphur off the bottom of the barrel. The sulphur should then be added, passing it through a sieve to break up lumps, and, finally, enough water to slake the lime into a paste, stirring vigorously to prevent caking. After the violent boiling, which accompanies the slaking of the lime, is over, it should be diluted for use, or enough water added to cool it. By this method only a small percentage of the sulphur goes into solution, but, if allowed to stand and remain hot too long, the sulphur and lime continue to unite, and the liquid may cause burning of the foliage. Hence the necessity of cooling the mixture as soon as the lime is well slaked. The amount of water added must be varied somewhat according to the quality of the lime. In applying this mixture, an outfit with a good agitator must be used.

The mixture was applied to peaches without injury to the foliage, and the results as regards peach scab and brown rot were fairly satisfactory.

In the case of trees defoliated by cherry leaf-spot, plots of trees were sprayed three times—on 20th May, 20th June, and 17th July—the first date being a month after blooming, and the second immediately after the crop was picked. From 75 to 85 per cent. of the leaves on unsprayed trees dropped during the first month, while most of the remaining leaves were badly spotted, and the trees eventually became practically bare. The self-boiled mixture and also the Bordeaux mixture were effective in controlling the disease, and the trees kept their foliage throughout the season. No injury resulted from the use of the lime-sulphur wash.

Owing to unsatisfactory weather conditions, the experiments as re-

gards apple scab were inconclusive. Very little difference could be observed in the results of the treatment with the different mixtures. Bordeaux mixture appeared to rank first in efficiency, commercial lime-sulphur second, and the self-boiled solution third. In another test, the lime-sulphur preparations caused no injury to the leaves, whereas the Bordeaux mixture browned the fruit, though it did little injury to the foliage.

OFFICIAL CIRCULARS AND NOTICES.

The following is a copy of the Rules made by the Board under the Commons Act, 1908 :—

The Board of Agriculture and Fisheries in pursuance of the provisions of the Commons Act, 1908, hereby make the following Rules :—

Definitions.—1. In these Rules :—

“ The Act ” means the Commons Act, 1908.

“ The Board ” means the Board of Agriculture and Fisheries.

Other expressions have the same respective meanings as in the Act.

Value of Interest.—2. The proportional value of the respective interests of the several persons for the time being entitled to turn out animals on a Common shall for the purposes of the Act be determined as follows (that is to say) :—

(a) Where such persons are so entitled in respect of the occupation of land and the interests are not defined by numbers or stints, then according to the proportional sum at which the land is rated to the relief of the poor :

(b) Where the interests are defined by numbers or stints, then according to the proportionate amount of the respective numbers or stints :

(c) In any other case, in such manner as the Board think proper.

Meetings.—3. A Meeting for the purposes of the Act shall be convened by the Board by a Notice stating generally the object of the meeting and specifying the day (not being less than 21 clear days after the date of the Notice) and hour and place of meeting ; and the Notice shall be published in such manner and at such places as the Board shall in each case direct.

4. The Board may, if they think fit, appoint an officer of the Board to be Chairman of the Meeting without power to vote thereat. If no such appointment is made, the meeting shall choose one of their number to be Chairman.

5. The Chairman may with the consent of the meeting adjourn the meeting from time to time and from place to place as occasion may require. When a meeting is adjourned for more than twenty-four hours, notice of the adjourned meeting shall be given as in the case of an original meeting.

6. The Chairman shall make or cause to be made minutes of all proceedings and resolutions of the meeting, and shall sign such minutes and deliver or send them to the Board, who may act thereon without requiring further or other evidence as to any matter appearing therein.

7. If the Chairman shall be of opinion on a show of hands that a proposed resolution under the Act has, or has not, been passed by the

Board would accordingly be obliged if your Local Authority would assist them in the matter by arranging to have post-mortem examinations made of the carcases of all horses slaughtered as clinically affected with Glanders. The results of autopsies on clinical cases could then be included in the report, in addition to the information furnished as regards horses slaughtered as a result of reaction to the mallein test. It would be convenient if the report could in future be furnished on a form similar to that printed overleaf.*

I am, &c.,

T. H. ELLIOTT,
Secretary.

A general index to the *Journal of the Board of Agriculture*, covering the issues for the ten years September, 1894, to March, 1904, has now been published, and may be obtained from the

Index to the "Journal of the Board of Agriculture." Office of the Board, 8 Whitehall Place, London, S W., price 1s. post free.

This index was originally prepared for departmental use, but in view of its general utility for purposes of reference, the Board have decided to place it on sale for the convenience of readers.

IMPORTATION AND OTHER REGULATIONS.

Live Stock Import Regulations in New South Wales.—According to a proclamation dated 23rd December, 1908, the importation of live stock into the State of New South Wales from certain countries is absolutely prohibited for one year from 29th December, 1908. Horses, asses, cattle, sheep, goats, and pigs may, however, be imported from England and Scotland *via* the ports of London, Liverpool, and Glasgow, or, in the case of pigs, *via* London and Glasgow only. Such stock are subject to the regulations made under the Stock Act, 1901, and horses and asses are subject to the mallein test, and cattle to the tuberculin test. The Order does not restrict the importation of dogs.

Plant Disease Regulations in the Transvaal.—The "Transvaal Government Gazette" of 28th May, contains a Government Notice (No. 576 of 1909), dated 26th May, laying down certain amended regulations under Ordinance No. 16 of 1904, for the purpose of preventing the introduction and spread of insect pests and plant diseases in the Transvaal.

These regulations, which are of some length, may be seen by persons interested, on application to the Commercial Intelligence Branch of the Board of Trade, 73 Basinghall Street, London, E.C. (*Board of Trade Journal*, 1st July, 1909.)

Destruction of Plant Pests in Ceylon.—An attempt has recently been made by the Government of Ceylon to secure by legislative means the eradication of plant pests. The principal feature of the law is the establishment of a permanent committee, to be termed the "Plant Pests Board" in different districts, who are empowered to require owners to carry out remedial measures. The pests to be dealt with

* Not printed.

and the measures to be adopted are specified by the Governor in Council, and up to the present an attempt has only been made to deal with two diseases, the object being to educate the people gradually to believe in the value of such work. Although it is as yet too early to say what success will attend the working of the law, no serious opposition has been experienced, and considerable progress has been made in dealing with two pests affecting the cocoa-nut tree.

Importation of Potatoes into the Transvaal.—The "Transvaal Government Gazette" of 11th June last contains a Government Notice (No. 646 of 1909) notifying, under the provisions of Ordinance No. 16 of 1904, that, on and after 1st September next, no person shall introduce into the Transvaal from outside South Africa any consignment of potatoes, unless accompanied by a certificate from the consignor stating fully in what country, and district of that country, the potatoes were grown, and also a certificate from the Board of Agriculture of the country in which the potatoes were grown to the effect that the disease known as "warty disease" or "black scab" has not been declared to exist in the district from which the potatoes come.

Any consignments not accompanied by such certificates will be liable to be seized and destroyed by the Department of Agriculture.

The Board of Agriculture and Fisheries have made an Order, dated 23rd July, 1909, under the Diseases of Animals Acts, 1894 to 1903, revoking their Orders of the 18th November, 1908, 20th November, 1908, and 28th November, 1908, which respectively prohibited the landing in Great Britain of hay or straw brought from the State of Pennsylvania; the States of New Jersey and New York; and the States of Maryland and Delaware, in the United States of America.

There are now no restrictions on the landing in this country of hay or straw brought from any part of the United States.

In connection with the International Agricultural Exhibition to be held at Buenos Ayres in 1910, of which notice has been given in this *Journal* (July, 1909, p. 330), special regulations have been made for the importation of live stock intended for the exhibition. From the United Kingdom, cattle, horses, etc., sheep, goats, and swine may be imported under the following conditions:—

**Importation of Live
Stock for the Buenos
Ayres Exhibition.**

Live stock must be landed at the port of Buenos Ayres. They must be accompanied by (1) an official health certificate from the country of origin, legalised by the corresponding Argentine Consulate, certifying the good state of health of the animals, and the good state with respect to animal diseases of the breeding establishment and department from which they come; (2) a second official certificate, similarly legalised, to the effect that they are free from infectious or contagious disease at the moment of shipment. The period of quarantine for cattle is ten days; for horses, the time necessary to make a

clinical examination and test with mallein; for sheep and goats eight days. During the quarantine, diagnosis with tuberculin and mallein is to be carried out in the case of cattle and horses. No animal will be permitted to enter the country which for any reason is suspected to be diseased. Animals infected with contagious and parasitic diseases will be treated in accordance with the Sanitary Police Regulations, or, should their owners so desire, be re-shipped for a foreign destination with the necessary precautions.

MISCELLANEOUS NOTES.

Production of Nitrate of Lime in Norway.—In the Report for 1908 on the Trade of Norway (*F. O. Reports, Annual Series, No. 4,278*), it is stated that an amount

Notes from Foreign and Colonial Office Reports. of £1,220,000 has been expended on the works for the production of nitrate of lime at Notodden and Svælgfos and the power stations under construction at Rjukan and Vamma. When all the works are completed at the end of the year 1910 an amount of £3,000,000 will have been spent. When the Rjukan Fall works are fully completed, they and the Notodden works combined will represent 240,000 horse-power, and by the autumn of 1910 it is calculated that the production will have reached 80,000 tons.

Cattle Raising in Mexico.—The Report for 1908 on the Consular District of Vera Cruz (*F. O. Reports, Annual Series, No. 4,258*) refers to the favourable prospects for the cattle-breeding industry in this State. One breeder in southern Vera Cruz has built up a very profitable business in breeding Devon bulls for sale to native stockmen. By careful and judicious crossing he has developed a Mexican Devon, a little smaller than the imported, but retaining all its good qualities of rapid growth and early maturity.

A good deal of information on agricultural prospects and conditions in Mexico is given in *F. O. Report, No. 4,287*.

Exhibition of Agricultural Machinery at Cape Town.—H.M. Trade Commissioner for South Africa (Mr. R. Sothorn Holland) reports that it has been decided to hold a South African exhibition at Cape Town, to which there is to be added an international show of agricultural implements and machinery. (*Board of Trade Journal, July 8th, 1909.*)

Agricultural Exhibitions and Congresses Abroad.

International Exhibition at Roubaix.—The British Vice-Consul at Croix (Mr. A. Faulkner) reports that it is proposed to hold an international exhibition at Roubaix (Nord) during the summer of 1911. The exhibition, which is being organised, under the auspices and with the authority of the French Government, by the Town and the Chamber of Commerce of Roubaix, is to be as comprehensive in character as possible. (*Board of Trade Journal, July 8th, 1909.*)

Agricultural Exhibition at Lahore.—The Commercial Intelligence Branch of the Board of Trade have received from the Director-General

of Commercial Intelligence at Calcutta copies of the first edition of the programme, rules, and regulations relating to an industrial and agricultural exhibition which is to be held at Lahore in November next.

Intending exhibitors should send to the Secretary of the Exhibition, Bharat Buildings, Lahore, a list of their proposed exhibits on the printed form attached to the programme: these lists will be received up to 1st September. Exhibits will be received from 1st October to 15th November.

Copies of the programme may be obtained by British firms interested on application at the Commercial Intelligence Branch of the Board of Trade, 73 Basinghall Street, London, E.C. (*Board of Trade Journal*, July 15th, 1909.)

Exhibition at Rostov-on-Don.—With reference to the notice in this *Journal*, June, 1909 (p. 221), relative to an agricultural and industrial exhibition to be held at Rostov-on-Don in September and October next, the Acting British Consul-General at Odessa (Mr. C. Goodwin) has forwarded a number of copies in Russian of the programme of the exhibition. These may be obtained by British firms interested, on application at the Commercial Intelligence Branch of the Board of Trade, 73 Basinghall Street, London, E.C.

Congress on Colonial Agriculture.—The International Scientific Association of Colonial Agronomy, the creation of which was decided upon at the first International Congress of Colonial and Tropical Agronomy in Paris in 1905, will hold its second Congress at Brussels in 1910. The International Exhibition, which will take place at the same time, will afford an opportunity for the investigation of many questions relating to tropical science. The date of the Congress will be chosen in agreement with the Committee of the International Congress of Botany, so as to allow the participation in the Congress of Colonial Agronomy of members of the Congress of Botany. The object of the International Association is the scientific and practical study of all the questions relating to tropical and colonial agriculture.

Congress for the Preservation of Natural Features.—An international Congress will be held at Paris from 17th to 20th October, 1909, on the initiative of the *Société pour la Protection des Paysages de France*. The subjects with which it is proposed to deal include the preservation of the natural features of the country both by private effort and public control, the preservation of sites of interest, historically or otherwise, the improvement of the architecture of towns, the prevention of the dis-afforestation of woodlands, &c.

The Crop Estimators of the Board, in reporting on the condition and prospects of the principal crops on the 15th July, generally comment

on the backwardness of the season as compared with former years, caused more particularly by the cold and dry spell of weather during May and the first two or three weeks of June, which has retarded the growth of late sown corn and early root crops, and has especially resulted in a deficient growth of grass. The abundant rains which fell from the third week of June onward appear to have had beneficial effects on the growth of the crops

generally, though their continuance has been detrimental in some respects, and especially in regard to the hay harvest.

General reference is made to the suitability of the season, from the autumn seed-time onwards, to the growth of wheat, the acreage of which is said to have been increased. An over-average crop is anticipated throughout Great Britain, but particularly in England. Barley also has been favoured by the seasonal conditions, and appears to give good promise throughout the country, except in Wales. The oat crop, on the other hand, is unsatisfactory throughout England and Wales, the wide prevalence of insect attacks having materially reduced the prospects of an average yield. In Scotland, however, the yield may slightly exceed the average.

Roots and potatoes promise well, though the season has not hitherto been favourable to the growth of mangolds.

As already indicated, the yield of hay is low, on account of the unfavourable spring and early summer. The yield in Scotland, though not up to the average, seems to be better than in England.

As regards fruit, apples, pears, and plums seem to be deficient. Strawberries were a large crop, though much damaged by the weather, and gooseberries promise to be the best of the fruit crops. Currants are likely to be under-average, on the whole.

Hops compare unfavourably with last year, and are stated to be seriously affected by vermin and blight.

Summarising the reports, and representing an average crop by 100, the appearance of the crops in mid-July indicates yields for Great Britain which may be represented by the following percentages:—Wheat, 104; barley, 103; oats, 96; potatoes, 104; roots, 104; hay, 92.

The weather during the month of July was, as a rule, ungenial. During the first week, warmth was "deficient" throughout the eastern section of the United Kingdom ("very deficient" in England E., S.E., and Midlands) and in England N.W. and S.W. Rainfall was less than the average, except in England S.E., but bright sunshine was also rather deficient. The rain occurred mostly in the early part of the week—that is to say, in June. During the *second* week the weather remained unsettled, with much cloud and rather frequent showers or periods of steady rain. The rainfall was "heavy" in every part of England, while warmth was everywhere "deficient." Sunshine in every part of England was "scanty." The *third* week witnessed a few fair or bright intervals in most parts of the Kingdom, and in England S.W. the rainfall was "light." Warmth was, however, "deficient" in England E., S.E., and S.W., while sunshine was "scanty," or "very scanty" everywhere, except in Scotland E., where it was "abundant." In the *fourth* week the weather varied a good deal, but regarded as a whole it was fair to fine in the south and east of England, and unsettled and showery in the north and west of the Kingdom. Rainfall was considerably more than the average in Scotland N. and W. and England N.W., but less in all other parts of Great Britain, the fall being much below the normal in England E. and S.E. Sunshine was generally "abundant." In

The last week ending July 31st, the weather was again extremely un-
~~usual~~, especially in the earlier half of the week, when heavy falls of
~~rain~~ were experienced over nearly the whole of Great Britain. Warmth
~~was~~ universally "deficient," rainfall "heavy" or "very heavy" every-
~~where~~, and sunshine in most places only "scanty." The abnormal
~~state~~ of the weather may be estimated from the return showing the
~~number~~ of weeks between June 6th and July 31st, which were below
~~the~~ average in warmth. In England S.E. it was seven out of eight.
~~In~~ England N.E., E., and S.W., it was six. In the Midlands and
~~England~~ S.W. it was five. In Scotland E. six, and Scotland W. five.
~~In~~ no place was one week above the normal.

Several correspondents have supplied information in connection with
the weather report. From Newbury, haymaking is described as "a
weary business, the ricks being mostly second- or third-rate quality."
A correspondent in Midlothian has sent several samples of wheat from
that county, and says they may be taken as typical examples of the
appearance and progress of the cereal there at the period of writing.
The stalks varied from five feet to five feet five inches long. The fol-
lowing report has been supplied by one of the officials of the South-
Eastern Agricultural College, Wye:—

"The month has been notable for heavy rainfall and cold weather
for the time of year. Corn is in some places rather beaten down by the
rain, but is fairly good, though harvest is a fortnight later than usual.
The weather during the making of clover hay was constantly wet, so
that two-thirds of the hay is damaged. Later meadow hay, cut at the
end of July, is a heavy crop, and being got up in fair condition. The
rain has been favourable to starting mangels and turnips. Maize has
been at a standstill, growing very little, because, although the land
was moist, the air was cold. Hops have been badly attacked by aphis,
and on the College farm have been sprayed with soft soap and nicotine
eight or nine times, using about 500 gallons of wash per acre each
time. Hop-picking will be later than usual. Warmth is wanted for
crops generally. The weather has suited stock, making the grasses
grow. Apples are short, and have been considerably knocked about
by the hail last week; gooseberries have been a fair crop; red-currants
very good; black-currants half a crop; plums very short; apples half a
crop: the latter are swelling slowly, due to lack of heat. Raspberries
have not been good here, many not properly maturing, and being unfit
to eat. Hail bruised the pea-pods; the weather for planting out
cauliflowers, cabbage, &c., was good."

Germany.—The report of the Imperial Statistical Bureau on the
state of the crops in the middle of July gives the arithmetical condition

**Notes on Crop
Prospects Abroad.**

as follows:—Winter wheat, 2'8; spring
wheat, 2'5; winter rye, 2'6; spring rye, 2'5;
barley, 2'3; oats, 2'5; and potatoes, 2'4. (1=
very good, 2=good, 3=medium (average), and 4=small.)

Winter grain, especially wheat, is somewhat thin and short in the
straw, but the cool, damp weather has had a favourable effect on the
development of the ear, so that a satisfactory corn crop may be ex-

pected. The condition of summer grain has much improved, and notwithstanding some unfavourable reports, it is considered that a good or fairly good crop may be looked for. Potatoes have continued to develop satisfactorily everywhere, but are beginning in many places to suffer from the wet weather.

Hungary.—The Report of the Ministry of Agriculture on the crops in the middle of July estimates the yield of the four principal cereals at a somewhat higher figure than in the earlier reports. Rye and barley have suffered in quality. Barley promised to give a large yield, but it now gives rise to many complaints. Rye is likely to be satisfactory, but wheat will barely reach an average crop. Oats are likely to give a good, and in places a very good, yield.

Russia.—According to a despatch received from Mr. H. Cooke, Commercial Attaché at St. Petersburg, the official *Commercial and Industrial Gazette* of June 27th/July 10th, states that the condition of the winter wheat crop is in general above the average, a great improvement having taken place during the last month. Spring crops have improved even more, and are above the average, even approaching good. Spring wheat is above the average, and good over a considerable zone and satisfactory elsewhere. It is unsatisfactory as yet sporadically over small separate areas in different localities. The condition of oats is similar but better, being in general near "good." Barley in general is above the average, and in the south in places excellent.

A despatch from Mr. H. Paton Smith, British Consul at Kieff, states that on 1st/14th June winter grain was somewhat above the average in the Kieff and Podol and Volhynia Governments, but spring grain was less satisfactory, in Volhynia the sowing being in places not yet finished. In the case of hops, plantations in the sheltered parts of Western Volhynia look better, but worse in Eastern Volhynia, especially in exposed districts. In general a good crop cannot be expected this year.

The British Vice-Consul at Rostov-on-Don (Mr. E. B. St. Clair), reported that in the middle of June both winter and spring cereals in the North Caucasus were in a satisfactory condition, and promised a fair yield. In the Voronezh Government, winter and spring cereals were very satisfactory. In the Don territory spring cereals, especially barley, were in excellent condition. Rye was rather less satisfactory.

H M. Consul-General at Odessa, in a despatch dated August 2nd, states that, according to the latest reports, the condition of the crops in his district is very satisfactory, and in some cases quite above the average. It seems that the quantity is more satisfactory than the quality, which in some places has been affected by untimely rain, but more often, and especially in the eastern parts of the district, by sudden and excessive heat. The harvest is proceeding under most favourable conditions, and it is almost certain that large quantities of grain will be available for export.

France.—The report of the French Ministry of Agriculture (*Journal Officiel*, July 28th), on the state of the crops on the 1st July gives the condition of winter wheat as good in 19 departments, satisfactory in 59 departments, and in 7 departments less satisfactory. Spring wheat

was described as good in 12 departments and satisfactory in 23. Spring barley was good in 33 departments and satisfactory in 37, while spring oats was good in 28 and satisfactory in 45.

Canada.—According to the Report of the Census and Statistics Bureau for July, the percentage condition of the principal crops on July 1st was: Winter wheat, 77'28; spring wheat, 86'77; oats, 93'81; hay and clover, 76'00; and pasture, 82'74. Cereals, except winter wheat, are higher than at the same date last year, while grass is lower. In the three North-West Provinces, the average condition of spring wheat was 95'53, and of oats 95'56.

Fruit Prospects in Canada.—A report published in the *Canadian Horticulturist* for July states that present indications point to a good crop in most fruit districts. In British Columbia apples promise well, and in Ontario also the prospects are good, a full bloom being reported on most varieties. The apple crop in Quebec is expected to be below the average, but in the Maritime Provinces it is expected to be very abundant.

Roumania.—According to reports in Dornbusch (July 28th), the wheat crop in Roumania appeared to be good, and likely to give a much better yield than last year.

Argentina.—H.M. Consul at Rosario (Mr. H. M. Mallet), in a despatch dated July 1st, states that an unusually prolonged drought is at the present time the cause of considerable concern throughout the Consular district. In some parts there has been no rainfall for nearly six months, and the mortality of animals is becoming daily more serious owing to the scarcity of fodder. Agricultural interests are also being affected, as the ground is so hard, and the animals required for ploughing the land are in such poor condition, that its preparation is difficult, and the sowing of grain is therefore much behindhand as compared with other years.

If the drought should continue much longer the position must become very serious for the country's interests, and in any case, as the winter is only commencing and there is a great scarcity of pasturage, it is feared that the mortality among live stock during the next three months will be serious.

The *River Plate Review* (July 2nd), states that, owing to the drought, the outlook is very unsatisfactory taken all round, and especially in the Province of Buenos Ayres. In Cordoba and in parts of Santa Fé the young wheat is coming up satisfactorily, as rain fell at an opportune time.

United States.—The Crop Reporting Board give the condition of the crops on August 1st as follows:—Maize, 84'4; spring wheat, 91'6; oats, 85'5; barley, 85'4; and potatoes, 85'8; as compared with 82'5, 80'7, 76'8, 83'1, and 82'9 respectively on the same date last year. Preliminary returns indicate a winter wheat crop of about 432,920,000 bushels, or an average of 15'5 bushels per acre, as compared with 14'3 last year.—(Dornbusch, August 9th, 1909.)

The acreage of potatoes in July was estimated at 3,452,000 acres, or 195,000 acres more than last year.

Hop Crop of Oregon.—According to a despatch dated June 25th from H.M. Consul at Portland, Oregon (Mr. James Laidlaw), recent

reports agree that the yield of the hop-fields in this district ~~in 1909~~ will prove very much smaller than in 1908, during which year ~~the crop~~ 22,000 acres in Oregon produced 92,000 bales (152,000 cwt.). ~~It is~~ reported that there are about 5,000 acres less in cultivation, and the estimates of the crop are generally 60,000 bales (99,100 cwt.) in Oregon, and 20,000 bales (33,000 cwt.) in Washington. Heavy frosts in the autumn and winter killed many of the roots, and many old yards are dying out, not having been renewed. Market prices have advanced, and from 4½d. to 5½d. per lb. has been paid recently for 1908 crop. Contracts for 1909 crop have been made as high as 6½d. Shipments from Oregon from December to May have been 93,332 bales (154,148 cwt.), while during the same period of 1907-8, shipments were 135,922 bales (224,514 cwt.).

Hop Crop of the World.—Messrs. John Barth and Son, of Nuremberg, in their Report of July 28th, state that the present state of the hop plantations in all the hop-producing countries is very unfavourable. In Bavaria the condition in the Hallertau and Spalt districts is good, but unsatisfactory in the mountainous and country districts. Wurtemberg, Baden, and Alsace-Lorraine are bad, whereas Posen promises a good result. In Austria-Hungary only a small medium crop is expected, while Belgium, France, England, and the United States form no exception to the generally unfavourable outlook. Messrs. Barth and Son accordingly anticipate that the forthcoming crop will be one of the smallest during the past twenty years. The stocks in brewers' hands in the whole world are, however, very considerable, while the consumption of beer has declined in most countries, so that prices are not likely to reach the level which, in other circumstances, would be justified by the small harvest.

The Board have received, through the Foreign Office, a despatch from Mr Consul-General Schwabach, dated 8th July, 1909, dealing with the fruit prospects for the year 1909 in the Berlin Consular District.

Fruit and Potato Crops in Germany.

The prospects of the fruit and potato crops in the Berlin Consular District for the year 1909 are, on the whole, favourable. The following results are expected in the province of Saxony, which is primarily concerned in the exports to Great Britain.—A good crop of pears, gooseberries, sweet and sour cherries, plums, and greengages; a satisfactory crop of apricots, peaches, apples, and walnuts, and a small crop of strawberries, raspberries, and currants. In some parts strawberries and raspberries suffered considerably in the winter, and apricots and peaches have also been affected by the cold. Currants were in several places attacked by frost while blossoming. While, therefore, the prospects of the berry crop are unsatisfactory in the province of Saxony, expectations in the other parts of the district, principally the province of Brandenburg and the Duchy of Anhalt, run considerably higher. Anhalt is, for instance, looking forward to a very good crop of gooseberries and currants, and the province of Brandenburg to a good one; and the other kinds of fruit are also promising in these parts. Potatoes are chiefly grown in Brandenburg, and good results are anticipated.

The Chambers of Commerce and Agriculture have co-operated in opening a "market" at Magdeburg, in the province of Saxony, which is to last from 15th June till 15th November. The object of this "market" is to attain greater facilities for the sale of fruit by showing thereat only samples, instead of all the fruit being put up for sale as is the custom elsewhere, the principle of sale according to sample thus being introduced to the fruit market. This "market" should prove of great advantage to British importers, more especially as the Chamber of Agriculture for the province of Saxony (address: Landwirtschaftskammer für die Provinz Sachsen, 7 Kaiserstrasse, Halle-on-Saale) is open to recommend trustworthy firms to act as purchasers for such British importers as are not already represented in the neighbourhood of Magdeburg.

The Board of Agriculture and Fisheries have been furnished by the Board of Trade with the following report, based upon about 210 returns from correspondents in various districts, on the demand for agricultural labour in England in July.

**Agricultural Labour
in England
during July.**

There was some irregularity in the employment of farm labourers during July, owing to wet weather, which delayed the haymaking. The root crop, however, although somewhat backward, promised a good deal of work, owing to the rapid growth of weeds. There was a fair demand for day labourers, as a rule, and the supply was usually adequate.

Northern Counties.—In *Northumberland* and *Cumberland* there was some irregularity in outdoor employment through wet weather and the backward state of the hay and root crops. Men for permanent situations were reported as fairly plentiful in certain districts of *Cumberland*. In *Westmorland* and *Lancashire* there was also some interruption by rain. Reports from *Yorkshire* state that although the weather was showery, employment was fairly regular on the whole during July. The supply of day labourers was usually sufficient, but a scarcity of shepherds is reported in the *Doncaster Union*.

Midland Counties.—Correspondents in *Derbyshire* and *Cheshire* state that employment was fairly plentiful in haymaking, potato-lifting, and hoeing. According to reports from *Nottinghamshire* and *Leicestershire*, the wet weather caused some irregularity of employment among haymakers. Day labourers were not in much demand, and the supply was generally quite sufficient. Similar reports come from *Staffordshire* and *Shropshire*. Work on the land in *Worcestershire* and *Warwickshire* was somewhat interrupted by wet weather, but weeds grew quickly, and caused some demand for labour. In *Northamptonshire* showery weather prolonged the haymaking, and there was a good deal of hoeing to be done. Day labourers were in demand, and in certain districts the supply was insufficient. A scarcity of men for permanent situations is reported from the *Brixworth Union*. Reports from *Oxfordshire* state that the haymaking was affected by the wet weather, and some day labourers lost time in consequence. There was a good demand for extra labour, which was fully met by the supply.

Employment was fairly regular in *Buckinghamshire*, other work being

found when haymaking could not be carried on. The supply of day labourers was usually sufficient, but a correspondent in the Wye Union states that in some cases roots had to be ploughed up because men could not be got to hoe them. In *Hertfordshire* and *Bedfordshire* employment was irregular, the unsettled weather causing some interruption to haymaking. The supply of extra labour was generally equal to the demand, but in the Buntingford Union (*Herts*) men were in request.

Eastern Counties.—Agricultural labourers in *Huntingdonshire* and *Cambridgeshire* were regularly employed, except for a few days, when hay-carrying and root-cleaning were hindered through rain. In *Lincolnshire* there were some wet days, which delayed the cutting and carting of hay, but turnip hoeing and other work afforded fairly constant employment on the whole. There was a good demand for day labourers, and the supply was usually sufficient. A correspondent in the *Sleaford* Union writes: "Owing to callers from Ireland and other districts, there are men to be had if required." In *Norfolk* outdoor work was a good deal interrupted by rain, and all hands were wanted for haymaking and hoeing beets and turnips when the weather permitted. The supply of extra labour was, as a rule, sufficient for requirements, the hay crop being light in many places. A report from the *Freebridge Lynn* Union states: "The wet weather has much interfered with employment of labour. Much time has been lost in all kinds of work, and the hay harvest has been a long one. High winds have also caused a stoppage of work when the weather was fine." Work on the land is reported to have been delayed in *Suffolk* and *Essex* by rain, and haymaking and hoeing were in arrear. Day labourers were in fair demand, but there was a surplus in some districts. Difficulty in obtaining cowmen was reported in the *Braintree* Union.

Southern and South-Western Counties.—Correspondents in *Kent* state that some time was lost by day labourers during July through wet weather. The supply of such men was quite equal to the demand, and in certain districts there was a surplus. Work was, however, generally plentiful, hoeing in some cases having to be repeated two or three times owing to the rapid growth of weeds. Farm labourers were fairly regularly employed in *Surrey* and *Sussex*, other work being found for them when haymaking could not be proceeded with. There was a sufficient supply of extra labour in most districts. Employment was generally regular in *Hampshire* and *Berkshire*, but some day labourers lost time on rainy days. The supply of such labour was in general equal to the demand. A correspondent in the *Petersfield* Union (*Hants*) reports that men for permanent situations are more plentiful than hitherto. Except on a few wet days, haymaking and hoeing furnished regular work to farm labourers in *Wiltshire* and *Dorsetshire*. Agricultural labourers were reported as having been mostly in regular employment in *Somerset*. A demand for extra labour was mentioned in the *Yeovil* Union. In *Hertfordshire* the regularity of employment was somewhat interfered with by rain. When, however, the weather permitted, there was full employment in haymaking, and in hoeing and singling the root crops. Men for tending stock were said to be in demand in several districts of this county. Reports from *Gloucester*

shire state that there was some irregularity of employment in certain districts. Day labourers were in fair demand for haymaking, root hoeing, and fruit picking; the supply, however, was in general quite sufficient. In *Devon* and *Cornwall* there was also some interruption through wet weather, but work was plentiful, and day labourers fairly well employed, on the whole.

THE CORN MARKETS IN JULY.

C. KAINS-JACKSON.

The harvest prospects of the world now influence the corn trade, and during the last fortnight of July the view was strongly held that the wheat harvests of 1909 in the United States, Canada, Russia, and Roumania would exceed those of the previous year. The opinion also prevailed that Russia would have a very large crop of barley, and the United States a good export surplus of oats after September, and of maize after November. This general impression of coming plenty made these products rather cheaper during the past month.

Wheat.—The home crop, when varying two million quarters from one year to another, may be said to show an exceptional degree of difference, but the vast areas under wheat in the United States exhibit differences of four or six million quarters on very small percentage changes in the yields per acre. The yield in the United States is not yet by any means assured, as the spring wheat crop is not ripe until the middle of August. Russia, too, has a very large area of spring wheat. The most interesting business item of July for many was the competitive offer by the United States and Russia of their winter wheat then being reaped. The United States asked at first 41s. for August shipment, but as the month progressed came down until, on the 31st July, 39s. 9d. was accepted. The small fraction under the forty shillings was regarded as likely to tempt buyers. Russia did not begin offering new crop wheat quite so early as America, but on the last day of the month there was a good choice of grades ranging from 40s. 6d. for common hard red of the Azoff type, up to 44s. 6d. for the finest selected grain. The American quotations are for a quarter of 480 lb., but the Russian offers represent 492 lb. to the quarter. These differences may roughly be adjusted by allowing a penny per lb. for the difference; thus Russian wheat at 41s. per 492 lb. is practically about equal to American at 40s. per 480 lb.

The price of foreign wheat from port granaries has been not much reduced, and, with only 1,250,000 qrs., just half an average, in the fifteen great ports, it is rather difficult to find any reason for a decline at all. Every ton of stored wheat will be required to meet ordinary weekly consumption long before the new wheat of America and Russia gets into consumption. Prices ruling at the end of July were about 49s. for the finest Canadian, 47s. for No. 3 Manitoba, a good fair average quality, 46s. for Russian winter a good sample, 45s. 6d. for Odessa Ghirka, 47s. 6d. for Australian, 46s. to 47s. for the great majority of samples from Argentina, 45s. 6d. to 46s. for New Zealand, 43s. 6d. to 44s. for Durum, and 43s. to 46s. for Indian wheat, of which

an exceptionally wide variety of types was on offer, the London Corn Trade Association alone quoting nine specific varieties.

The month's shipments were 493,000 qrs. from North America, 1,130,000 qrs. from South America, 1,373,000 qrs. from Russia, 1,436,000 qrs. from India, and 105,000 qrs. from Australia. The supply on passage fell from 3,100,000 to 2,210,000 qrs.

British wheat was a very dull trade all through July, but the very great scarcity prevailing made it easy to maintain the mean value at well above forty shillings for the entire kingdom. A few "forward" sales of standing wheat took place in the last week of the month, 42s. being paid in the Isle of Thanet, and 40s. in Norfolk.

Flour.—Very small sales of flour marked the month, and bakers are reported to hold but small stocks. The price of the best flour in Mark Lane, Hungarian, declined from 53s. to 52s. per sack, but remained extremely high as compared with ordinary years. The best London grade, known as Top-price, closed on the 31st, as it started on the 1st, at 39s. The popular type, Town Households, fluctuated very slightly, 34s. 3d., 34s. 6d., 34s. being quoted at different markets. The close of trade saw 34s. accepted, but the market firm at that level. American flour was a fair supply at 30s. 6d. to 34s. 6d. for ordinary sound grades, and 35s. 6d. to 36s. for specially fine patent makes. Towards the end of the month there were offers to ship in September new grists of the American winter wheat crop. Flour made by roller from guaranteed fair average quality new wheat was obtainable for September shipment at 30s. 9d. cost freight and insurance to London.

Barley—Scarcely any malting barley has been on offer since mid-summer, but a little Chilian Chevallier has been sold at Liverpool for 39s. per 448 lb., and a sample or two of Moravian has fetched 42s. at Mark Lane. The Californian brewing type has been occasionally offered at about 34s. per 448 lb. The English malting barley of 1908 appeared to be wholly played out, but "robust inferior brewing" or "bold poultry" barley was now and again met with during the month, 27s. being a very usual price. The feeding barley from Russia has been on sale for the last five or six weeks at 22s. to 22s. 6d., and cargoes to arrive in the course of August were sold during the last three days of July at 21s. 6d. per qr. These cargoes are of 1908 barley. A few sales of the Russian new crop for October shipment have been put through at a guinea per 400 lb. The month's shipments were 1,244,000 qrs. from Russia. From all other countries they were insignificant.

Oats.—Excellent prices were made in July for British oats, a guinea per 312 lb. being, as a rule, the lowest price accepted, and 23s. to 25s. per 336 lb. being paid by owners of good horses. The supply of New Zealand oats was extremely small, but their fine quality caused them to top the market with 26s. paid per 384 lb. More ordinary but still excellent New Zealand made 22s. 6d. per 320 lb. The large sales of light oats from Russia and Argentina were put through only when a low price was accepted; 17s. to 18s. may be given as the range. Although the Argentine oats are "made up" to 304 lb., their actual weight is sometimes as low as 272 lb., so that 32 lb. have to be added. The addition does not unhappily alter the fact that for oats to weigh under 304 lb. argues a quality that is very discouraging.

Shipments for the month were 139,000 qrs. from Argentina, and 550,000 qrs. from Russia.

Maize.—Traders on the London Exchanges assert that they do not remember a year when the influence of the coming maize crop has been greater than it has been during the past July. The crop report for the 1st July issued from Washington disclosed a great increase in the area under maize in the United States, and at the same time showed that the first six weeks of growth (the date of sowing may be averaged as mid-May) had been healthy. Within a week of this document appearing, the new crop, which will not be ripe before October or shippable until some time after that, was on free offer at 24s. for January shipment, cost freight and insurance to London. During the period 20th–30th July there were fluctuations between 23s. and 24s., but on the last day of the month the opening price had re-established itself, and 24s. was paid. There have been considerable sales, nearly all of them of a *bond-fide* character, which is the expression used at the “Baltic” to denote that the purchaser means to take actual delivery. For prompt supply *ex* warehouse maize has fallen to about 26s. for both round and yellow. Flat is hardly to be had. July shipments were 30,000 qrs. from North America, 1,965,000 qrs. from South America, 187,000 qrs. from Russia, 447,000 qrs. from Roumania, and 10,000 qrs. from Natal.

Pulse.—The demand for English beans of the old crop has been good, the supply small, and 39s. to 40s. per 532 lb. has been realised. Foreign beans have been scarce, with the exception of Japanese soy kinds. These have advanced rapidly in favour, and are believed to be of considerable feeding value. They are sold at 7s. to 7s. 2d. per cwt. The price of peas is not much changed. On the 30th, at Mark Lane, 32s. 6d. was paid for newly-arrived Manchurian.

Oilseeds.—The price of oilcake depends upon oilseeds, so that the market for the latter is much more important to our farmers than it used to be, and every year sees more attention paid to it. Indian linseed in London has averaged for July 47s. 3d. against 44s. last year, and 41s. 9d. for July, 1907. These figures are not very reassuring to farmers, who are depending for a cheaper supply mainly on Argentina; the produce of that country averaged at Mark Lane in July 45s. 9d. against 42s. 3d. last year and 41s. 3d. in July, 1907. Rapeseed at 42s. to 46s. for Indian is 1s. cheaper on the month. Cottonseed is not usually obtainable for less than 8s. per cwt. Egyptian, 6s. 6d. Indian. The supply on passage is less than usual.

Farm Seeds.—The last London market of July saw the first arrival of new Chilian red cloverseed. The price asked was 56s. per cwt. This is moderate for fair average quality; the new stuff, unfortunately, was not up to that standard. It remains to be seen if improved quality will mark the fuller arrivals of August and September. There are no changes of importance to note in English farm seeds. Prices customarily ruling per cwt. are 62s. to 64s. for choice red cloverseed, 68s. to 70s. for cowgrass, 64s. to 66s. for white cloverseed, 82s. to 84s. for alsyke, and 47s. to 49s. for suckling clover. Of imported articles, lucerne from the South of France makes 76s. to 78s.; trefoil, 27s. to 28s.; and New Zealand cocksfoot, 80s. to 82s. per cwt.

Minor Staples.—Canaryseed is increasing in value, and English farmers who have any left should be able to obtain 54s. per 464 lb. for it,

which is the price of Turkish and Argentine. At equal value buyers generally prefer the English. If a fair crop, say three quarters to the acre, could be depended upon, canaryseed should pay to grow in Eastern and South-eastern England. Lentils at 40s. per qr. are regarded as dear by the average buyer. During July there was a steady sale for poultry mixtures at 21s. to 24s. per 336 lb., for barleymeal at a guinea per 336 lb., and for the leading by-products of the mill. Most districts quoted about 7s. 6d. per cwt. for the finest middlings, and 5s. per cwt. for the commonest bran, other rough grists ranging in price between these two points.

THE LIVE AND DEAD MEAT TRADE IN JULY.

A. T. MATTHEWS.

Fat Cattle.—The month began with a very good week, for, notwithstanding the difference in the condition peculiar to the time when all the supplies are grass-fed, the demand continued so brisk that prices showed a further advance. First quality Shorthorns in 22 English markets averaged, practically, 8s. 7d. per stone, which was about 1d. per stone more than the last week in June, and second quality 7s. 9d. The rise in values up to this point had been remarkably steady for many weeks, never pausing, but moving very slowly and gradually upwards. At Newcastle the quotation of 9s. 3d. for Shorthorns was, I believe, a record price for many years, and this was nearly equalled at Basingstoke, where 9s. 2d. was recorded. There was, however, a very wide range of values over the country, and at Dorchester the price was 1s. lower than at Newcastle, London being well above the average at 8s. 9d. As regards other breeds, Herefords started at 8s. 10d. for first and 7s. 10d. for second quality; Devons 8s. 6d. and 7s. 8d., and Scots 8s. 10d. and 8s. 5d.

There was a slackening in the cattle trade the next week, or, more correctly, a slight relaxation in prices, for the demand continued good, and the difference in the value of the offal, sometimes called the "fifth quarter," more than accounted for the falling off in quotations. In six markets prime Shorthorns still fetched 8s. 9d. per stone, or 7½d. per lb., but in 22 English markets the average fell to 8s. 5½d., a drop of about 1½d. on the week. There was a somewhat heavier fall on the second quality, amounting to nearly 2d. per stone. The dearest markets in the week were Basingstoke, 9s. 2d.; Newcastle, 9s.; Ashford, London, Nottingham, and Preston, 8s. 9d., Lincoln being the lowest at 8s.

So far as the English markets are concerned, a rather similar state of things prevailed in the week ending July 22nd. There were the usual complaints in many places of scarcity of first quality, and the average of the quotations for prime Shorthorns again slightly declined to the extent of 1d. per stone. But as there was no corresponding fall in second quality, it is plain that there was no diminution in the demand or decline in intrinsic value, but only a slight reduction in the quotations for first quality. There was a considerably heavier

decline in the quotations for Herefords, amounting in the five markets given to 4d. per stone, while Devons and Polled Scots fell about ½d. per stone. In the two last-mentioned breeds, second quality was practically unchanged, as was the case with the Shorthorns. In Scotland the trade in the third week was much stronger than in England, and nearly every market was quoted higher. Supplies were short, and in some cases insufficient for the local demand. Prime quality bullocks fetched 44s. 9d. per live cwt. at Aberdeen, and 45s. in Edinburgh, although such sales were, of course, exceptional. At the last Monday's market at Islington there was a surprisingly short supply, only 650 fat cattle being on offer, and even for recent years this was far below the average. It is a rare thing in this market to see Shorthorns in a minority, but on that occasion their numbers fell below that of the Herefords. The condition of the latter was also superior, and this was made evident by the prices realised. Trade was good all round, and Herefords easily made an advance of ½d. per lb., as did also the Devons, of which there were only 20 present. The Shorthorns showed much less finish, and consequently fetched no more money per stone. The best of them were quoted at 8s. 5d., and second quality 7s. 10d., against 9s. and 8s. 5d. for Herefords. The general results of the month's trade in cattle show that the highest prices were touched in the first week, and although subsequently there was some decline, they were still a shade higher at the end of the month than they were at any time during May. Prices for Polled Scots and Shorthorns at Islington on the 26th were exactly the same as on the corresponding day last year.

Veal Calves.—The supplies of fat calves in the country generally were more than equal to the demand. The consumption of veal was probably smaller than usual owing to the cool weather which has characterised the summer. In the earlier part of the month the average price for best quality was 8d. per lb., but it declined to the extent of about ½d. in the second week, and then remained fairly steady to the end.

Fat Sheep.—The trade in sheep opened with great dulness, and the market reports of the first week scarcely sounded a single cheerful note. It is true that small Down tegs weighing, say, 60 to 64 lb. just maintained their average value of 7½d. per lb. in the seventeen markets quoting them, but the number that could be so classed is comparatively very small, and by far the larger proportion of sheep now on offer are wethers weighing from 72 to 84 lb., which are described as second quality. These declined slightly during the first week, and averaged about 6½d. Longwools for some reason did relatively better, for in 15 markets their average for first quality remained firm at 7d., and their second quality at 6½d. per lb. Newcastle was still the best market, and Downs were there quoted up to 8½d. per lb., while at Bristol, Leicester, and York, best quality was only 7d.

There was no improvement in the tone of the markets in the second week, and several accounts referred to want of quality and condition. Prices for Downs, however, appeared to have touched bottom, for, taking the average of eighteen markets, Downs were certainly no cheaper, first quality remaining at 7½d., and second showing a fractional advance. Longwools, on the other hand, gave way, and prices

fell slightly. The extreme quotation for Downs was 8d., and this was only reached at Chichester, Newcastle, and Salford. Although some markets held in the week ending July 22nd were described as the worst of the season, yet more hopeful signs of some recovery were not wanting. Trade was decidedly better at Hull, Newcastle, Peterborough, and Wakefield, all of which are important markets, and on the whole, the price of Downs averaged a fraction more for first and second qualities, Longwools also exhibiting a similar advance. The last market at Islington was considerably more cheerful, and, notwithstanding a much larger supply, buyers purchased so much more freely that prices had to be quoted $\frac{1}{2}$ d. per lb. higher all round except for ewes, which were almost unsaleable. Looking back to the corresponding market last year at Islington, we find that Downs made up to $8\frac{1}{2}$ d., Longwools $7\frac{1}{2}$ d., Cross-breds $8\frac{1}{2}$ d., Scotch Half-breds $9\frac{1}{2}$ d., and Cheviots 9d. per lb.

Fat Lambs.—Lambs have been freely marketed all the month, and values have been in sympathy with those of mutton. In the first week the average of 40 markets was 9d. per lb. for prime, $8\frac{1}{2}$ d. for second, and $7\frac{1}{2}$ d. for third quality. Thus it will be seen that big forward lambs were making no more than small mutton, and many were sold as such. The next week the average price declined nearly $\frac{1}{2}$ d. per lb., and the top price at Islington was $8\frac{1}{2}$ d. In the third week there was a further reduction of about $\frac{1}{2}$ d. for first quality, with no sign of improvement in the last days of the month.

Fat Pigs.—The supplies of fat pigs have not been large, even for the time of year, and while, on the one hand, dried bacon was fetching a high price, on the other feeding stuffs have been too dear to induce farmers to fatten more extensively. It is not surprising, therefore, that where pigs were on offer they should find ready purchasers at full prices. Even at these, however, it is maintained that there is very little profit attached to feeding them. Bacon pigs, at the beginning of the month, averaged 7s. 3d. per stone in Great Britain for prime small, and 6s. 7d. for heavier, pigs. These prices were increased later in the month by about 1d. per stone.

Carcass Beef.—The values of all home-killed beef were remarkably steady, but the extreme uncertainty of the Argentine trade was again exemplified. In the first week Scotch long sides were fetching $6\frac{3}{4}$ d. to $6\frac{1}{2}$ d. per lb. against $5\frac{1}{2}$ d. to $6\frac{1}{2}$ d. for English, and $6\frac{1}{2}$ d. to $6\frac{1}{2}$ d. for port-killed. It must be understood that the English beef in the Central market which is here quoted is not of the primest quality, while the port-killed is the best of its class. The supplies of the latter were also short, and none was procurable at Smithfield under $6\frac{1}{2}$ d. per lb. Chilled American started at 6d. to $6\frac{1}{2}$ d. per lb. for hind quarters, and remained very steady at about those figures during the whole of the month, while Argentine began at $5\frac{1}{2}$ d. to $5\frac{1}{2}$ d., and afterwards declined to $3\frac{1}{2}$ d. to $4\frac{1}{2}$ d. per lb. Frozen also began at the high values of $4\frac{1}{2}$ d. to $4\frac{1}{2}$ d. for hind quarters, and $2\frac{1}{2}$ d. to 3d. for fores, but declined steadily till, at the end of the month, it stood at $3\frac{1}{2}$ d. to $3\frac{1}{2}$ d. for hind, and $2\frac{1}{2}$ d. to $2\frac{1}{2}$ d. for fore quarters. In the second week Scotch and English declined $\frac{1}{2}$ d. per lb., and port-killed $\frac{1}{2}$ d., the latter being quoted $\frac{1}{2}$ d. dearer than English, and on the 21st the difference was $\frac{1}{2}$ d., but at the end of the month both were quoted at 6d. per lb. for first quality, while

English second quality was fetching more than the American by $\frac{1}{4}d.$ per lb. That London Central Market prices are no safe guide to the relative quality or value of English as compared with port-killed American, is shown by the prices realised for them at our other great markets. For instance, in the week ending July 22nd, English sides were fetching more than port-killed at Birmingham by 1s. 2d.; at Leeds, 4s. 8d., and at Manchester, 2s. 4d. per cwt.

Carcass Mutton.—The demand for Scotch and English mutton has been sluggish throughout the month. Scotch started at 7d. to $7\frac{1}{4}d.$ per lb., and English at $6\frac{1}{4}d.$, in London. The latter was fetching $\frac{1}{4}d.$ more at Birmingham and Leeds, but only 6d. at Liverpool. Dutch was selling at 5d. to 6d. per lb. All these prices were just about maintained till the end of the month. With regard to frozen, trade was decidedly against sellers, and those who speculated in this article are known to have incurred heavy losses. In the first week the best New Zealand was worth $3\frac{1}{4}d.$, in the second week it fell to 3d., and the last two weeks it stood at $2\frac{3}{4}d.$, and lower qualities at 2d. per lb. This extreme cheapness is beginning to be recognised as the chief cause of the lower price of home-grown.

Carcass Lamb.—Complaints of the very poor demand for British lamb were very general. In the first week the extreme top price of English in London was $7\frac{1}{4}d.$ per lb., with excellent quality selling at 7d., and sales being difficult even at that figure. In the second week none was fetching more than 7d., but this reduction only held for one week, and $7\frac{1}{4}d.$ was the value of prime small carcasses during the remainder of the month. The value of frozen was quite as much depressed as that of mutton. In May the best Canterbury was making $5\frac{1}{4}d.$, and started in July at $4\frac{3}{4}d.$, but declined as the month advanced to 4d. per lb., while $3\frac{1}{4}d.$ was the value of the best Australian. It would be strange indeed if the value of home-grown was not affected by such extremely low rates for an article which appears to satisfy such a large number of consumers.

Veal.—The trade for veal in London was very dragging, and British was only fetching 6d. per lb. for the first three weeks in July. In the last week there was an improvement of about $\frac{1}{4}d.$ per lb. Considerably higher prices were again realised at Leeds, Liverpool, Manchester, and Birmingham.

Pork.—The demand in London was very small, but supplies being moderate, prices were firm. The first two weeks the London price was $5\frac{1}{4}d.$ to 6d., but advanced to 6d. to $6\frac{1}{4}d.$ per lb. before the close.

THE PROVISION TRADE IN JULY.

HEDLEY STEVENS.

Bacon.—Although prices generally advanced during the month of July on account of the continued small supplies, the trading has again been very disappointing to all concerned. The wet and unseasonable weather has curtailed consumption in all districts, but more especially at seaside resorts. Arrivals from Denmark are still on the short side, but have, nevertheless, been fully equal to the demands of the reduced consumption.

Canadian bacon continues to arrive in very small quantities, and, in consequence, higher prices have been realised, but results are yet unsatisfactory to the Canadian packers on account of the high prices demanded for hogs. A recent issue of the *Montreal Trade Bulletin* says:—"That the raising of hogs in Canada is rapidly decreasing is indicated by the proportionately large number of sows that have lately been marketed. This, together with the great scarcity of hogs and their high price, has reduced the export trade in bacon very materially, as Danish bacon is underselling Canadian in the English market. Live hogs sold in this market during the week at \$9.00 per 100 lb., such high prices precluding the possibility of shipping bacon to the English market except at an unprofitably low figure. The supply of hogs is so small that immense quantities of American hog products have to be imported in order to supply the home market. The Canadian export bacon trade was at one time quite a lucrative business, but during the past few years it has dwindled down to almost nothing."

During the whole of the month arrivals from the United States have been very small, but apparently sufficient for the reduced consumption. Hams have been selling a little more freely, but merchants have been accepting orders at from 4s. to 6s. per cwt. under the prices they would have to pay in America in order to replace their stocks. Towards the end of the month hogs arrived more freely at Chicago, some selections falling to \$7.90, as against \$8.40 earlier in the month.

English pigs continue scarce, and extreme prices have been realised. There is a favourable opportunity for breeders to make money if they have any young stock coming on.

Cheese.—All dealers report an unsatisfactory month's trade. Canadian shippers have been able to keep prices on a basis which prevents merchants being able to make a satisfactory profit on this side of the water. Delivery figures for London show that there has been considerably less business done for July than at the same time last year, also the arrivals which passed through Surrey Commercial Docks since January 1st were over 100,000 cheese less than for the corresponding period of last year. Prices are a little lower than last season.

The make in Canada is reported to be below the normal, and up to July 17th the receipts into Montreal were about 4,000 boxes less than last year, when the quantity was considerably below the previous year. At the end of the month the estimated stocks at the three principal distributing centres (London, Liverpool, and Bristol) were 216,000, against 236,000 last year, and 221,000 two years back.

The make of English cheese has been large, and prices were easier by the end of the month. In some sections the quality is reported to be irregular, doubtless owing to the unseasonable weather.

Butter.—There has been a steady trade throughout the month, with an absence of speculation, dealers preferring to buy as required. Arrivals from Siberia have been large, but will shortly be much smaller. Arrivals from Australia and New Zealand have been very small, this being the end of their season. A few shipments have arrived from Canada, but the prices there are still considered to be above a safe export basis. The make is reported to be less than last year.

Eggs.—There has been a moderate trade, with prices slightly dearer at the end of the month, especially for reliable selections.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and SCOTLAND
in the Month of July, 1909.

(Compiled from Reports received from the Board's Market
Reporters.)

Description.	ENGLAND.		SCOTLAND.	
	First Quality.	Second Quality.	First Quality.	Second Quality.
FAT STOCK:—	per stone.*	per stone.*	per cwt.†	per cwt.†
Cattle:—	s. d.	s. d.	s. d.	s. d.
Polled Scots	8 9	8 4	41 1	37 11
Herefords	8 8	7 10	—	—
Shorthorns	8 6	7 8	40 1	37 1
Devons	8 7	7 10	—	—
	per lb.*	per lb.*	per lb.*	per lb.*
	d.	d.	d.	d.
Veal Calves	8	7½	8	6¾
Sheep:—				
Downs	7½	6¾	—	—
Longwools	7	6½	—	—
Cheviots	8	7½	7½	6¾
Blackfaced	7½	7	7½	6½
Cross-breds	7½	6½	8	7
	per stone.*	per stone.*	per stone.*	per stone.*
	s. d.	s. d.	s. d.	s. d.
Pigs:—				
Bacon Pigs	7 4	6 10	6 9	6 0
Porkers	7 7	7 2	7 3	6 6
LEAN STOCK:—	per head.	per head.	per head.	per head.
Milking Cows:—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk ..	20 19	17 14	22 0	18 0
„ —Calvers	20 16	17 12	19 7	16 16
Other Breeds—In Milk ..	18 5	14 10	18 17	16 0
„ —Calvers	15 7	13 18	18 19	15 14
Calves for Rearing	2 5	1 15	2 10	1 17
Store Cattle:—				
Shorthorns—Yearlings ..	9 18	8 5	10 18	8 10
„ —Two-year-olds ..	14 5	12 6	14 12	11 18
„ —Three-year-olds ..	17 16	15 1	17 15	13 15
Polled Scots—Two-year-olds	—	—	15 16	13 9
Herefords—	15 11	13 9	—	—
Devons—	13 18	12 11	—	—
Store Sheep:—				
Hoggs, Hoggets, Tegs, and Lambs—	s. d.	s. d.	s. d.	s. d.
Downs or Longwools ..	30 0	24 7	—	—
Scotch Cross-breds ..	—	—	34 8	30 6
Store Pigs:—				
Under 4 months	25 8	19 4	24 8	19 4

* Estimated carcase weight.

† Live weight.

**AVERAGE PRICES of DEAD MEAT at certain MARKETS in
ENGLAND and SCOTLAND in the Month of July, 1909.**

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Quality.	London.	Birming- ham.	Man- chester.	Liver- pool.	Glas- gow.	Edin- burgh.
		per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
BEEF :—							
English ..	1st	57 0	58 0	57 0	—	61 0*	60 6*
	2nd	54 0	53 6	54 6	—	57 6*	54 0*
Cow and Bull ..	1st	42 0	50 6	50 6	47 0	50 6	48 6
	2nd	35 0	44 0	45 6	42 0	42 0	43 0
U.S.A. and Cana- dian :—							
Port Killed ...	1st	59 0	57 0	56 0	56 6	57 6	55 6
	2nd	54 6	52 6	53 0	52 6	54 0	50 0
Argentine Frozen—							
Hind Quarters...	1st	39 6	40 0	39 6	39 6	37 0	41 0
Fore „ ...	1st	26 6	29 6	29 0	29 0	29 6	28 6
Argentine Chilled—							
Hind Quarters .	1st	47 0	47 0	47 6	46 6	48 6	47 6
Fore „ ..	1st	30 0	31 6	31 6	30 0	32 6	31 0
American Chilled—							
Hind Quarters—	1st	63 0	62 0	61 6	61 6	56 0	64 0
Fore „ ..	1st	38 6	39 6	38 6	38 6	39 6	41 0
VEAL :—							
British ..	1st	58 0	62 6	67 0	70 0	—	—
	2nd	53 0	53 0	62 0	65 0	—	—
Foreign ..	1st	58 0	—	—	—	—	56 6
MUTTON :—							
Scotch ..	1st	70 0	—	64 6	64 6	70 6	64 0
	2nd	65 6	—	60 6	59 6	54 6	52 6
English ...	1st	61 0	61 6	61 6	59 0	—	—
	2nd	57 0	52 6	57 0	54 6	—	—
U.S.A. and Cana- dian -							
Port Killed ...	1st	—	—	—	—	—	—
Argentine Frozen	1st	26 0	27 0	25 6	26 0	26 0	25 6
Australian „	1st	24 0	25 6	24 0	24 0	26 0	—
New Zealand „	1st	28 0	24 6	—	—	—	—
LAMB :—							
British ...	1st	70 0	67 6	64 6	63 6	73 6	65 0
	2nd	65 6	63 0	60 0	58 6	59 6	55 0
New Zealand	1st	40 0	43 0	40 0	40 6	48 6	45 6
Australian „	1st	34 0	34 6	31 6	31 6	34 0	—
Argentine ...	1st	34 0	35 0	31 6	31 6	34 0	36 0
PORK :—							
British ..	1st	58 6	63 0	62 0	61 0	60 0	58 6
	2nd	53 6	58 6	57 0	56 0	58 0	49 6
Foreign ...	1st	58 6	—	58 6	58 6	—	—

* Scotch.

AVERAGE PRICES of British Corn per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1907, 1908 and 1909.

Weeks ended (<i>in</i> 1909).	WHEAT.						BARLEY.						OATS.					
	1907.		1908.		1909.		1907.		1908.		1909.		1907.		1908.		1909.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Jan. 2 ...	26	0	35	1	32	0	23	11	26	9	26	7	17	3	18	4	17	4
" 9 ...	26	1	35	2	32	9	24	2	26	9	26	11	17	4	18	3	17	5
" 16 ...	26	1	35	5	32	8	24	1	27	1	27	1	17	5	18	5	17	5
" 23 ...	26	2	35	6	33	2	24	5	26	11	27	3	17	5	18	5	17	8
" 30 ...	26	3	35	0	33	0	24	4	26	11	27	6	17	5	18	4	17	9
Feb. 6 ...	26	6	34	3	33	4	24	5	26	9	27	7	17	7	18	3	17	10
" 13 ...	26	7	33	1	33	8	24	1	26	9	27	8	17	7	18	0	17	11
" 20 ...	26	10	32	6	34	1	24	2	26	5	27	11	17	9	17	11	18	0
" 27 ...	26	9	30	11	34	5	24	2	26	3	28	0	17	9	17	8	18	0
Mar. 6 ...	26	8	30	5	34	10	23	11	26	1	27	11	17	11	17	8	18	2
" 13 ...	26	10	31	3	35	8	24	2	26	0	28	4	18	0	17	10	18	2
" 20 ...	26	10	31	7	35	9	24	0	26	2	28	0	18	1	17	11	18	5
" 27 ...	26	8	31	4	36	0	23	9	25	10	28	0	18	2	17	10	18	6
Apl. 3 ...	26	9	31	3	36	5	24	3	25	5	27	10	18	3	17	9	18	8
" 10 ...	26	8	31	2	37	4	23	9	25	10	28	0	18	6	17	7	18	10
" 17 ...	26	8	30	11	38	7	23	3	26	1	27	8	18	7	17	7	19	2
" 24 ...	26	10	30	10	41	4	23	3	25	5	28	2	18	9	17	9	19	9
May 1 ...	27	0	31	6	42	5	23	6	25	8	27	10	19	3	18	0	20	0
" 8 ...	27	6	32	4	40	9	24	0	25	5	27	7	19	7	18	4	20	3
" 15 ...	28	4	33	1	41	6	23	10	24	9	27	3	20	1	18	7	20	6
" 22 ...	29	7	33	8	42	8	24	3	25	9	27	0	20	5	18	10	20	11
" 29 ...	31	4	33	5	42	6	24	0	24	6	26	3	20	8	18	8	21	0
June 5 ...	32	0	33	1	43	1	24	7	25	10	25	7	20	7	18	4	21	3
" 12 ...	31	10	32	7	42	11	24	7	24	5	26	10	20	11	18	4	21	4
" 19 ...	31	4	32	0	42	7	24	11	24	2	26	10	20	9	18	5	21	6
" 26 ...	31	2	31	5	42	8	24	6	24	0	27	2	20	8	18	7	21	7
July 3 ...	31	3	30	11	42	9	24	8	23	11	27	2	20	11	18	7	21	9
" 10 ...	32	0	30	5	43	0	24	10	24	4	26	4	20	11	18	5	21	8
" 17 ...	32	6	30	7	43	3	24	6	23	1	26	10	21	1	18	5	21	9
" 24 ...	32	11	31	5	44	0	27	3	26	5	27	4	20	8	18	6	22	5
" 31 ...	33	2	31	10	43	5	26	4	24	4	24	6	21	2	18	7	22	2
Aug. 7 ...	33	5	31	6	44	9	26	6	23	1	27	4	21	3	18	9	22	11
" 14 ...	33	6	31	6			25	9	23	10			20	4	18	1		
" 21 ...	33	7	31	2			25	0	24	5			19	8	17	10		
" 28 ...	33	10	30	10			24	6	24	5			18	11	17	1		
Sept. 4 ...	31	11	30	10			24	2	25	5			17	7	17	3		
" 11 ...	31	4	31	5			24	4	25	11			17	6	17	6		
" 18 ...	31	5	31	7			25	0	26	0			17	6	17	3		
" 25 ...	31	8	31	5			25	3	26	8			17	8	17	2		
Oct. 2 ...	32	6	31	7			25	5	26	11			17	9	17	2		
" 9 ...	33	3	31	5			25	9	27	5			17	11	17	0		
" 16 ...	34	4	31	2			26	3	27	6			18	0	17	0		
" 23 ...	35	9	30	11			27	2	27	5			18	7	16	11		
" 30 ...	36	3	30	8			27	7	27	5			18	10	16	11		
Nov. 6 ...	35	10	30	11			27	8	27	6			18	10	17	0		
" 13 ...	35	1	31	2			27	8	27	4			18	8	17	0		
" 20 ...	34	7	31	10			27	5	27	3			18	9	17	3		
" 27 ...	34	7	32	3			27	5	27	2			18	7	17	5		
Dec. 4 ...	34	7	32	7			27	1	27	2			18	6	17	4		
" 11 ...	34	8	32	8			27	0	27	0			18	5	17	4		
" 18 ...	34	9	32	9			27	1	26	9			18	3	17	3		
" 25 ...	34	6	32	2			26	10	26	8			18	0	17	2		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lbs.; Barley, 50 lbs.; Oats, 39 lbs. per Imperial Bushel.

AVERAGE PRICES of Wheat, Barley, and Oats per Imperial Quarter in FRANCE, BELGIUM, and GERMANY, and at PARIS, BERLIN, and Breslau.

		WHEAT.		BARLEY.		OATS.	
		1908.	1909.	1908.	1909.	1908.	1909.
		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
France :	June	37 9	44 6	25 6	28 5	19 8	24 9
	July	37 2	44 1	25 4	28 2	19 8	24 8
Paris :	June	38 6	46 7	26 2	25 5	19 3	27 2
	July	38 6	45 8	26 2	29 8	19 3	26 11
Belgium :	May	35 5	42 5	26 5	26 10	21 3	23 3
	June	34 6	45 5	26 3	25 11	21 5	25 5
Germany :	May	46 0	52 9	27 7	30 6	22 7	26 1
	June	44 8	56 10	26 4	29 11	22 3	27 3
Berlin :	May	47 3	55 6	—	—	22 10	25 5
	June	45 5	57 5	—	—	22 7	26 6
Breslau :	May	44 4	51 6	28 6	32 6	20 9	25 3
				(brewing)	(brewing)		
				25 11	26 0		
				(other)	(other)		
	June	43 7	57 7	28 6	32 6	20 6	26 3
				(brewing)	(brewing)		
				26 0	26 0		
				(other)	(other)		

NOTE.—The prices of grain in France have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*; the Belgian quotations are the official monthly averages published in the *Monteur Belge*; the German quotations are taken from the *Deutscher Reichsanzeiger*, the prices for the German Empire representing the average of the prices at a number of markets.

AVERAGE PRICES of British Wheat, Barley, and Oats at certain Markets during the Month of July, 1908 and 1909.

		WHEAT.		BARLEY.		OATS.	
		1908.	1909.	1908.	1909.	1908.	1909.
		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
London ..	..	32 0	41 4	26 6	26 9	19 3	20 6
Norwich ..	..	30 2	42 8	23 3	26 10	17 11	21 7
Peterborough ..	..	30 0	43 7	24 3	26 11	17 7	21 8
Lincoln ...	..	29 9	43 4	24 11	—	17 6	22 4
Doncaster ..	..	30 1	43 2	—	—	18 1	22 1
Salisbury ..	..	30 11	43 7	—	25 8	18 10	21 9

**AVERAGE PRICES of PROVISIONS, POTATOES, and HAY at certain
MARKETS in ENGLAND and SCOTLAND in the Month of
July, 1909.**

(Compiled from Reports received from the Board's Market Reporters.)

Description.	London.		Bristol.		Liverpool.		Glasgow.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
BUTTER :—	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British ..	13 0	12 0	14 0	12 6	—	—	14 0	—
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery	107 6	104 0	108 6	105 0	103 0	100 0	104 6	—
„ Factory	101 6	99 0	98 6	96 6	95 0	89 0	—	—
Danish ..	113 6	111 6	—	—	114 0	111 0	113 0	—
Russian	101 6	98 0	102 6	98 6	102 0	96 6	100 0	96 6
Australian ...	100 0	98 0	103 0	96 0	—	—	—	—
New Zealand	106 0	104 0	110 0	107 0	—	—	—	—
CHEESE :—								
British—								
Cheddar ...	70 6	62 6	75 0	69 0	72 0	68 0	63 0	59 6
	120 lb.	120 lb.			120 lb.	120 lb.		
Cheshire ..	68 0	59 6	—	—	65 0	60 0	—	—
	per cwt.	per cwt.			per cwt.	per cwt.		
Canadian ...	58 6	57 6	59 0	57 0	58 0	56 6	58 6	57 0
BACON :—								
Irish ...	75 0	71 6	77 0	72 0	77 6	70 6	71 0	69 0
Canadian	67 0	—	66 6	65 0	67 0	64 6	67 6	66 0
HAMS :—								
Cumberland ...	105 0	92 0	—	—	—	—	—	—
Irish ...	100 0	92 0	—	—	—	—	101 0	92 0
American								
(long cut) ...	62 0	—	61 6	60 0	63 0	59 6	64 6	62 6
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British ...	11 0	10 0	9 7	9 2	—	—	—	—
Irish ...	9 7	8 7	8 8	8 2	9 0	8 0	8 4	7 3
Danish ...	9 8	8 5	—	—	9 2	8 7	8 11	7 9
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Duke of York	100 0	90 0	85 0	80 0	—	—	—	—
Early Puritan	60 0	55 0	80 0	75 0	—	—	—	—
Other								
First Earlies	80 0	65 0	75 0	70 0	100 0	91 6	71 6	—
HAY :—								
Clover ...	82 6	67 6	74 0	—	89 6	65 0	79 6	75 0
Meadow ...	74 6	61 6	65 0	—	—	—	61 0	58 0

DISEASES OF ANIMALS ACTS, 1894 to 1903.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

DISEASE.	JULY.		SEVEN MONTHS ENDED JULY.	
	1909.	1908.	1909.	1908.
Swine-Fever :—				
Outbreaks	232	181	1,143	1,373
Swine Slaughtered as diseased or exposed to infection ..	1,959	1,346	10,185	7,414
Anthrax :—				
Outbreaks	108	80	826	698
Animals attacked	146	125	1,101	940
Foot-and-Mouth Disease :—				
Outbreaks	—	—	—	3
Animals attacked	—	—	—	112
Glanders (including Farcy) :—				
Outbreaks	40	95	344	505
Animals attacked	138	224	1,291	1,558
Sheep-Scab :—				
Outbreaks	8	4	464	633

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

DISEASE.	JULY.		SEVEN MONTHS ENDED JULY.	
	1909.	1908.	1909.	1908.
Swine-Fever :—				
Outbreaks	25	16	75	126
Swine Slaughtered as diseased or exposed to infection ...	523	618	1320	2697
Anthrax :—				
Outbreaks	—	1	3	5
Animals attacked	—	1	3	8
Sheep-Scab :				
Outbreaks	28	6	313	271

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THE JOURNAL OF THE BOARD OF AGRICULTURE.

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THE GENUS *CHERMES* IN ITS RELATION TO FORESTRY.

R. STEWART MACDOUGALL, M.A., D.Sc.

The genus *Chermes* of the family *Aphidæ* is one of great interest in forestry, partly because of its complicated biology and partly because of the damage done by the sucking insects and the unsightly appearance of plants infested by them.

Progress in real knowledge of the *Chermes* insects may be said to date from 1887, when Blochmann noted the fact that there was a migration of *Chermes* generations from the Spruce to the Larch and back again. Dreyfus worked out this life history independently, as did also Cholodkovsky. More than anyone, Cholodkovsky has made this genus his own with a work in 1889, a monograph in 1895 and 1896, a further work in 1902, and one in 1907. Eckstein in 1890, in Prussia, and Nüsslin in 1903, in Bavaria, have both written on the biology of the *Chermes* that are found on the genus *Abies*. Burdon has recently,* in three articles in the *Journal of Economic Biology*, given an account of his own observations and experiments, together with a *résumé* of Cholodkovsky's work on *Chermes*, thereby placing foresters and biologists generally in Britain deeply in his debt.

In the literature on *Chermes* and in the text-books there is considerable confusion regarding the terminology, and in this article I shall follow that of Cholodkovsky, adding a note

* E. R. Burdon, M.A., F.L.S., in the *Journal of Economic Biology*, 1907, Vol. II, pts. 1, 2, and 4.

here and there which may serve as a guide to the names given by other workers. Cholodkovsky, in his recent work, enumerates eleven European species of *Chermes*, but to declare how many of these will persist as absolutely true species, and how many exist in Britain, will still require patient and prolonged research.

The difficulties in this respect are due to a variety of causes—the smallness of the insects, the varied characters that are relied on for distinction, the microscopic differences in these characters, the varying structure of the *Chermes* in its different stages and generations, the complicated biology, and the migration which may take place to a second or intermediate host tree, with the added difficulty that in the same generation we may have parallel series differing both in habit and in structure.

Apart from true specific structural differences, it is possible to group the *Chermes* in Britain biologically according as they are found (a) to make galls on the Spruce (*Picea*), (b) to infest the needles and bark of the Larch (*Larix*), (c) to infest the needles or bark of twigs and stems of Pines (*Pinus*) and Silver Firs (*Abies*).

The Distribution of Chermes in Britain.—*Chermes* galls on the Spruce (*Picea*) are common all over the country. In Scotland I know the gall-making *Chermes* from Inverness-shire southwards, and the galls have been sent to me from Hertford, Shropshire, Nottingham, Wiltshire, and Sussex.

Chermes on Larch I have either taken or had sent to me from Sutherlandshire to Wigton; indeed, from Sutherland southwards it can be found in every county. I have records of its occurrence in North and South Wales, and in Yorkshire, Norfolk, Lincoln, Shropshire, Bedford, Nottingham, Rutland, Sussex and Devon. My records also show *Chermes* on Scots Pine (*Pinus sylvestris*) in Fife, Perthshire, Forfar, and Yorkshire; on Weymouth Pine (*Pinus Strobus*) in Suffolk; on *Abies pectinata* in Aberdeen, Sutherland, Perth, Dumfries, and Devon; on *Abies Nordmanniana* in Aberdeen, Sutherland, Perth, and Midlothian; and on *Abies nobilis* in Perthshire and Fife.

General Description.—As introductory to the detailed life histories the following general statements may be helpful:—

1. *Chermes* is an enemy of trees, but confines its attacks to Coniferæ.

2. The normal and complete life history of a species may take two years. There is a change of host, two different species of Conifer being made use of, one the primary host, and the other the secondary, or intermediate, host.

3. The primary host is typically the Spruce (*Picea* sp.); the intermediate host is a *Larix*, *Pinus*, or *Abies*.

4. The foundresses on the primary host give rise to galls; no galls are formed by the other generations.

5. In the two years' cycle with change of host there are five different generations:—

(a) The foundresses: wingless females.

(b) The migrant daughters: winged females. (Some of these may remain on the Spruce without flying to the intermediate host, and complete the cycle in one year).

(c) The emigrants, or colonists—as Burdon happily calls them. These are wingless females.

(d) A generation which may be in two parallel series: (1) the exiles—viz., wingless females that remain on the intermediate host; and (2) the *sexuparæ*—viz., winged females which fly to the primary host.

(e) A sexual generation of wingless males and females.

6. Of these various generations the colonists almost completely resemble their grandmothers in structure and also in habit, save that they do not give rise to galls. The *sexuparæ* resemble their grandmothers both in structure and in habit. The exiles (except that they do not give rise to galls) resemble their mothers and their great-grandmothers in structure and habit.

7. There are three chief forms in the cycle: (a) wingless virgin females; (b) winged virgin females; (c) males and females.

8. In certain species the life cycle is completed in one year; the host is a Spruce (*Picea*), and there is no intermediate host. A wingless generation alternates with a winged, and only females are known.

9. Exceptionally a species, *Chermes viridanus* Chol., is found on Larch and Larch only.

LIFE HISTORY OF *Chermes viridis** RATZ.

The primary host is the Spruce (*Picea*). The intermediate host is the Larch (*Larix*).

Description of Gall.—The gall on the Spruce looks like a miniature pine-apple or a small cone. The foundress has her proboscis sunk in the base of the bud, and as a consequence the shoot and the base of the young needles swell and the needles meet at their edges. The green tips of the needles project above the galled portion. The gall is pale green or bleached in appearance. Sometimes the fused edges of the lower swollen parts of the needles are reddish in colour, and the gall has a mottled appearance. Typically the gall is one-sided, the shoot not being affected all the way round; the shoot also grows beyond the gall (occasionally there is no growth beyond the gall).

GENERATION 1: *The Foundress.*—A larval *Chermes*, hatched from a fertilised egg, anchors itself in the autumn by sinking its long proboscis of bristles into the base of a Spruce bud. In this position the dormant larva—not very noticeable as it rests protected on the underside of the bud—passes the winter. In the next spring the awakened larva begins to feed, and by the end of a month and after three moults is the adult foundress. This foundress is very small, and is oval in shape and green or dark green in colour; the antennæ are three-jointed. From chitinous glandular plates on the upper surface of the body a wool or wax is secreted, and in spring the position of the insect may be indicated by the speck of white wool.

The foundress generation consists exclusively of wingless females, which lay round them little heaps of green or dark green eggs that are fixed by means of delicate stalks. After egg-laying, the foundresses die. From the eggs hatch greenish-yellow larvæ, which develop into Generation 2.

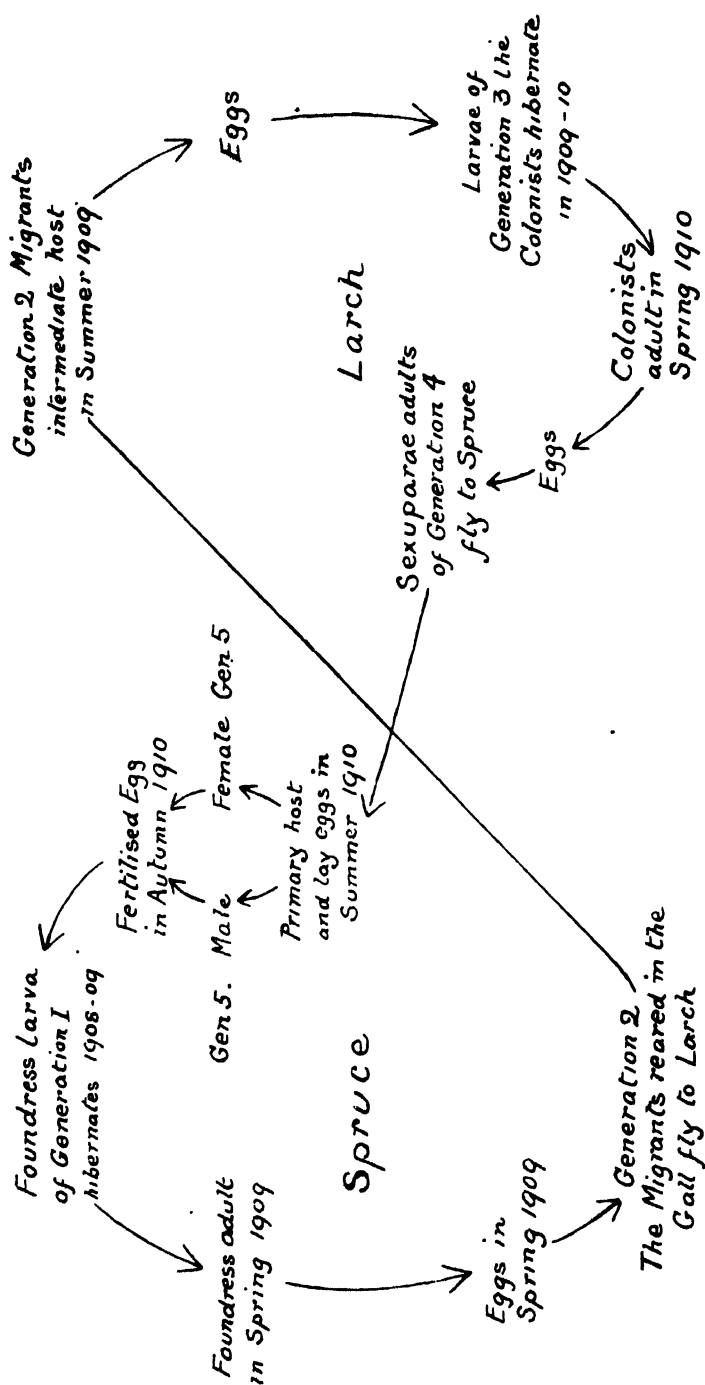
GENERATION 2: *The Winged Migrants.*—These larvæ have short probosces, three-jointed antennæ, and no woolly excretion, and become enclosed in the chambers of the gall formed by the swollen bases of the needles that have become fleshy and scale-like (the gall having arisen as the result of the sucking of the foundress), and, thus protected, develop to the nymph stage. In this nymph stage, characterised by wing-sheaths, the insects issue from the gall in July, the chambers of the gall having opened owing to the drying of the gall. The nymphs are red-brown in colour, and after a fourth and last moult become adult.

The adults of this 2nd Generation are all females, and are winged. They are reddish or yellow-brown in colour, and have five-jointed antennæ; there is also a slight woolly excretion on the upper surface. The wings are four, held sloping like the tiles of a house, and the hind pair are smaller.

These winged adults of Generation 2 fly to the Larch, and on the Larch needles lay dark green eggs. From these eggs the larvæ which will develop into Generation 3 hatch in the autumn.

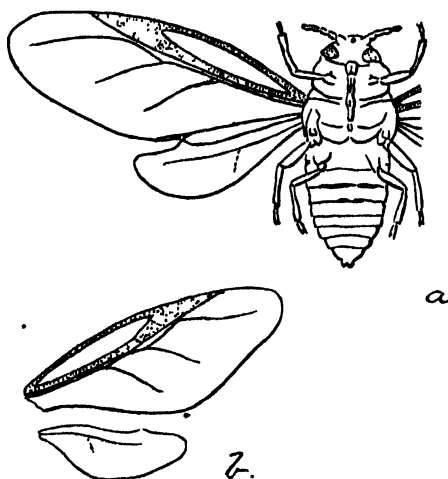
GENERATION 3: *The Colonists.*—The larvæ from the eggs on the

* *Chermes pibitis* Linn. includes what are now known as *C. viridis* Ratz. and *C. abietis* Kalt.

GRAPHIC ILLUSTRATION OF THE LIFE HISTORY OF *CHERMES VIRIDIS* RATZ.

larch needles suck the needles. As the cold season approaches, the larvæ leave the needles, and fix themselves in crevices of the bark of the larch by the proboscis, and so fixed pass the winter. In the next spring—just like their grandmothers, the foundresses—they feed, and after three moults become adult, and lay round them their eggs. The eggs are bright green. From these eggs are hatched larvæ which develop into the adults of Generation 4.

GENERATION 4: *The Sexuparæ*.—This is the generation preparatory to the Sexual Generation. The naked larvæ feed on the young shoots and needles, the needles becoming kneed in consequence. The young and adults of Generation 4 are pale yellowish-green. The adults are all females, and are winged. They resemble their grandmothers of Generation 2, only they are smaller and lay a less number of eggs. They fly to the Spruce and lay on the leaves a small number (the

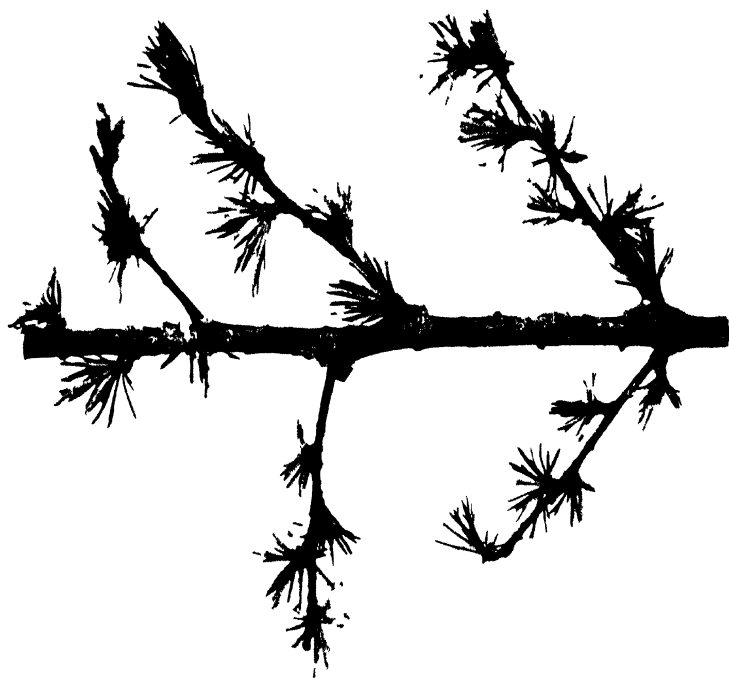


CHERMES ARMITIS KALT. (after Nitsche): *a*, winged female; *b*, separated wing. (Highly magnified.)

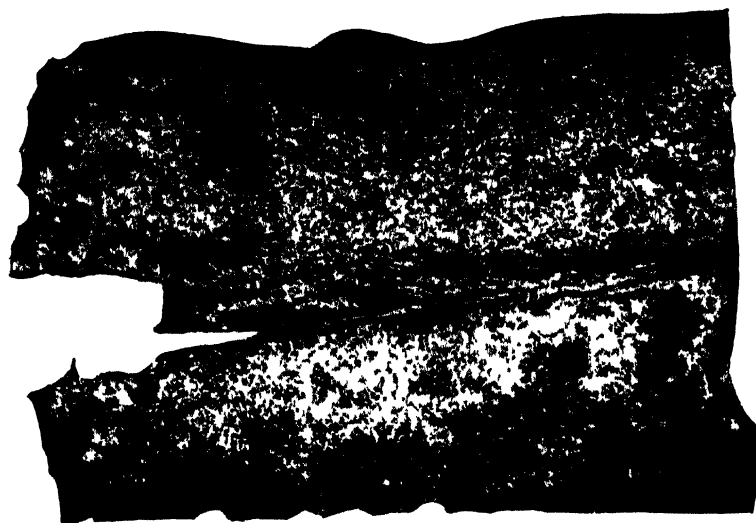
number is given in the literature on the subject as ten) of greenish-yellow eggs, in May or June. From these eggs are hatched larvæ which will develop into the adults of Generation 5.

GENERATION 5: *The Sexual Generation of Males and Females*.—The larvæ feed on the needles of the Spruce, under, it may be, the wings or dead body of the mother, and after three moults become sexual individuals—males and females. Both are wingless. They are extremely minute, the females measuring in length 0.5 mm. to 0.6 mm., and the males less. The proboscis is short, and the antennæ in both sexes are four-jointed (the antennæ are three-jointed in the larvæ). Pairing takes place, after which the fertilised female, in high summer, creeps into some crevice in the bark at the base of the shoot, and there lays one large egg. From this egg in autumn there hatches the larva which passes the winter at the base of a bud, and develops in the next spring into the adult foundress of Generation 1.

Graphically this life history may be represented as on p. 445.



JAPANESE LARCH TWIG, SHOWING CLUSTERS OF FEMALE APHIDES
(*Chermes*), WITH EGGS (a).



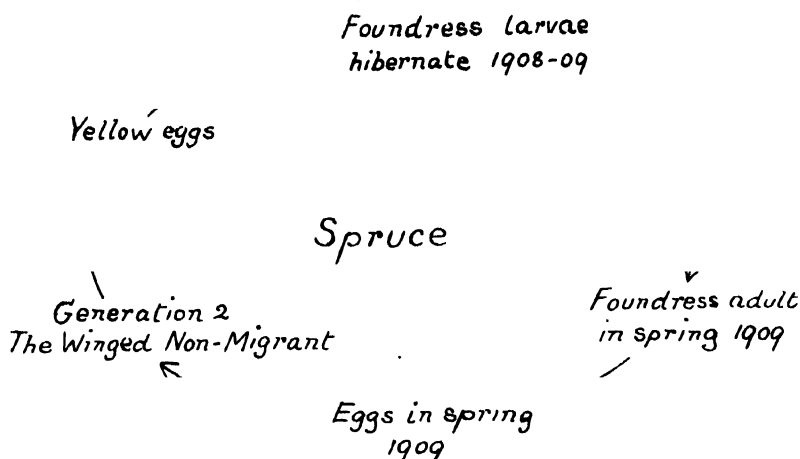
BARK SHOWING INFESTATION OF APHIDES
(*Chermes*).

LIFE HISTORY OF *Chermes abietis* KALT.

The primary host is the Spruce. There is no intermediate host, and the life cycle is completed on Spruce in one year. There are two alternating generations, with no sexual multiplication; a wingless generation, corresponding to the Foundress Generation of the life history given above, alternates with a winged generation corresponding to the Migrant Generation.

The gall on the Spruce—the work of the foundress—resembles that of *Chermes viridis* Ratz., but is smaller. It is also said to be ripe later, opening at the end of July (the galls of *Chermes viridis* may be ripe, in the south, in May).

The life history may be represented graphically thus:—



GRAPHIC ILLUSTRATION OF THE LIFE HISTORY OF *CHERMES ABIIIS* KALT.

The galls and the insects of these generations resemble those of the other species so closely, though the insects are yellow rather than green, that *Chermes viridis* Ratz. and *Chermes abietis* Kalt. are very difficult to distinguish.

Exceptionally members of Generation 2 may wander or migrate to conifers other than Spruce, but the eggs, if laid there, are unproductive.

LIFE HISTORY OF *Chermes strobilobius* CHOL.

The primary host is the Spruce (*Picea*), the intermediate host is the Larch (*Larix*), and there are five generations.

In connection with Generation 4 there is additional complexity inasmuch as this generation in *C. strobilobius* divides itself into two parallel series. A certain number of the insects of Generation 4 become winged adults, and behave just as the *sexuparæ* of *Chermes viridis* Ratz. Others, however, of the same Generation, do not become winged when adult, but as wingless females remain on the intermediate host; this series is known as the Exile Generation. Ultimately the progeny of the Exiles pass the winter on the intermediate host like the larvæ of the Colonists of Generation 3, and develop in the following spring into adult Colonists.

Graphically the life history of *Chermes strobilobius* Chol. may be represented as on p. 449.

The foundress larva of *Chermes strobilobius** Kalt. hibernates on the bud, and a gall results, small, stunted, round, and cone-like. The gall is without marked projecting needle-tips, i.e., the needles of the bud broaden out to form the scale-like parts of the gall. The gall ends the shoot, or at most there is a small tuft of needles beyond it. The colour of the gall is yellowish-white. On its outside many sucking larvæ can be found. The gall may be ripe by the middle of June.

The adult *C. strobilobius* Foundress is red-brown in colour, and has long strands of hanging wool; the eggs are dirty-green. The adult Migrants of Generation 2 are red-brown or dark red, almost black on the upper surface at the front end; they show on thorax and abdomen two lines of woolly secretion. The adults measure in length 1.25 mm. to 2 mm.

The Colonist larvæ, found on the needles of the larch in summer and early autumn, hibernate on the bark of the larch. These Colonists on the larch are distinguishable from the foundress larvæ on the Spruce by the fusion of the glandular plates on head and thorax into a sort of chitinous shield, and by the absence of wool. The adult Colonists at the base of the dwarf-shoots of the larch are bronze-brown in colour, and are bare of wool; each lays a large number of brown or green-brown eggs.

The two parallel series of Generation 4 are the Exiles and the *sexuparæ*, and these, when young, suck on the larch needles, and cause them to knee or bend. These young are dark in colour—blackish or brown—and have no woolly secretion.

The adult Exiles are dark brown in colour; they secrete a marked white wool, under cover of which their green-brown eggs are laid. The adult *sexuparæ* are winged, and resemble their grandmothers of Generation 2, but are smaller and have a brown-white wool. Of Generation 5, on the needles of the spruce, the males are olive-brown and the females orange-yellow.

LIFE HISTORY OF *Chermes lapponicus* CHOL.

Just as previously we had in *C. abietis* Kalt. a species allied to *C. viridis*—which confined itself to Spruce—so Cholodkovsky distinguishes a species *C. lapponicus* allied to *C. strobilobius*, but confining itself to the primary host Spruce.

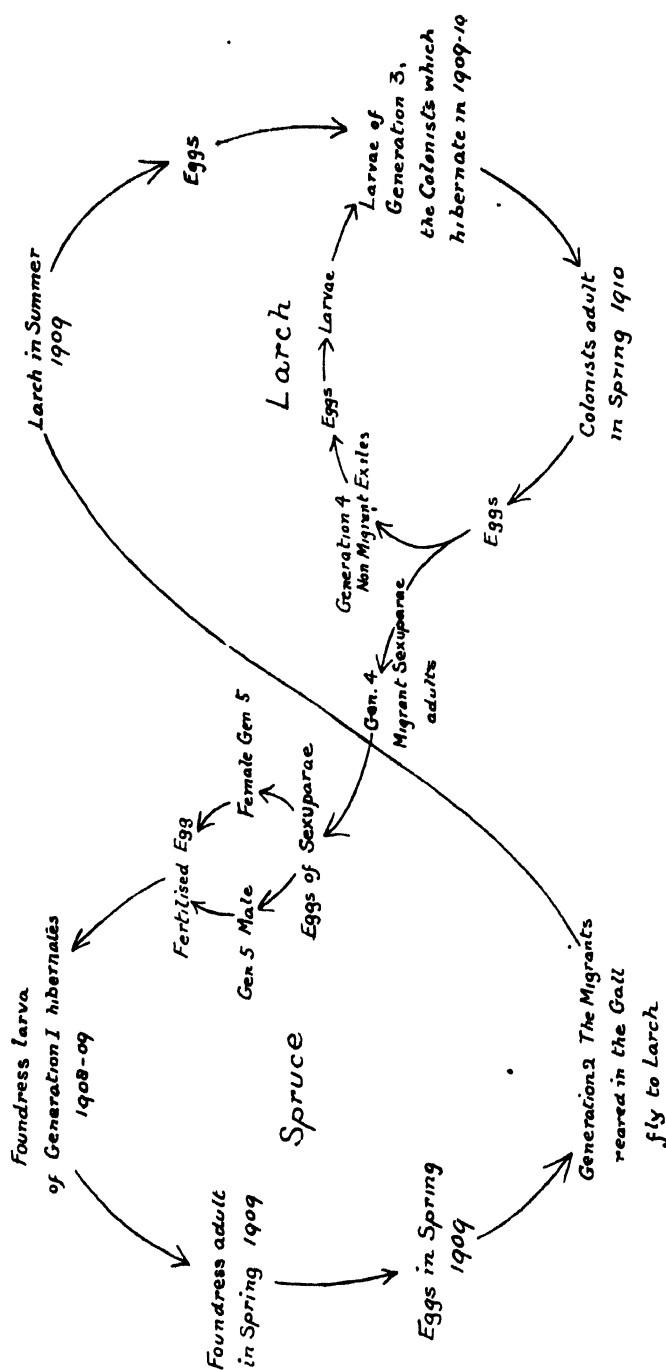
The galls of *C. lapponicus* are similar to those of *C. strobilobius*, and the insects of the two alternating generations can scarcely be distinguished from the same two generations of *C. strobilobius*.

Of the foundress generation of *C. lapponicus* Cholodkovsky distinguishes two varieties, one whose galls open early and one where the galls open late.

DISTINCTION BETWEEN SPECIES.

It has been stated earlier that distinctions between *Chermes* species are very difficult. A helpful means of distinction is found in the comparison of the hibernating foundress larvæ.

* *C. strobilobius* Kalt. is the *C. coccineus* Ratz. in part, and *C. laricis* Ratz. of the books.

GRAPHIC ILLUSTRATION OF THE LIFE HISTORY OF *CHERMES STROBILOBUS* CHOL.

In the winter condition examination of the upper surface of the abdomen of the larva, and of the mesothorax and metathorax, reveals six longitudinal rows of chitinous glandular plates; these plates on the prothorax and the head have coalesced into larger structures. The plates bear the pores from which the wax or wool exudes. The following is a comparison of the hibernating foundresses of *C. viridis* and *abietis* with those of *C. strobilobius* and *lapponicus*.

C. viridis.

At the head end 2 large plates, which have at their corners groups of 4 to 5 pores surrounding a fine hair.

On the prothorax are 2 large, squarish central plates with groups of pores 3 to 5 in number, and 2 oval side plates with pore groups at the front and hind ends.

On the mesothorax and metathorax are 4 small, 4-cornered, 4-pored plates, and 2 oval 8-pored plates.

The abdominal rings have each 6 small plates; these plates on the front rings are 4-pored, and on the hind ones 2-3-pored.

C. strobilobius.

At the head end are 2 large, four-sided plates, which have at each corner a single large wax pore.

On the prothorax are 2 large, central square plates with a large pore at each corner, and also 2 oval side plates.

On the mesothorax and the metathorax and on the abdominal segments are 6 small plates each of which bears a single prominent pore (under a high magnification each large pore is found to be surrounded by a series of tiny pores).

Of the remaining species of *Chermes* that may be present in Britain the knowledge regarding the insects and their life history is very incomplete. We have representatives at least of species whose intermediate host is *Pinus* or *Abies*.

Chermes WHOSE INTERMEDIATE HOST IS *Pinus*.

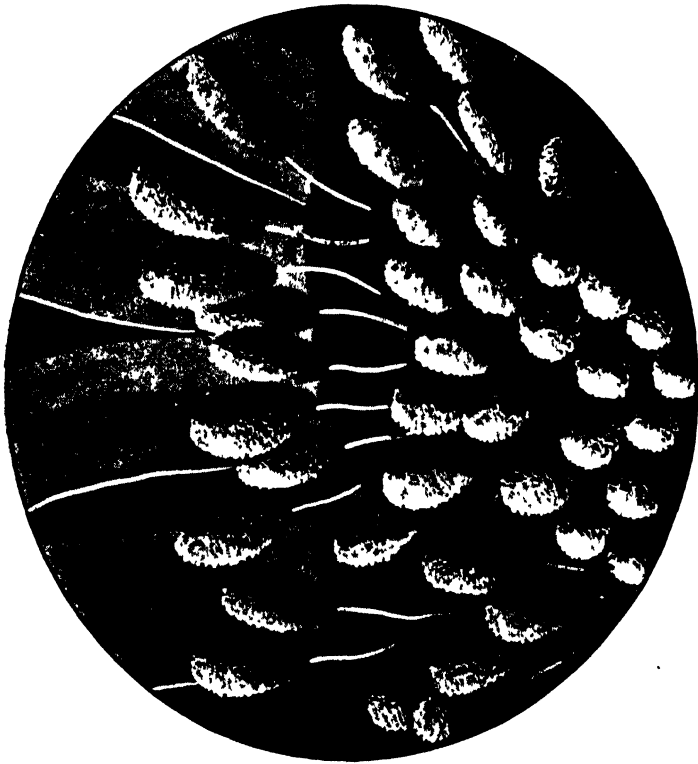
Of such Cholodkovsky describes two, viz., *Chermes orientalis* Dreyfus, and *Chermes pini* Koch.

The primary host of *orientalis* is *Picea orientalis*, the Oriental Spruce, and rarely the common spruce, *Picea excelsa*; the intermediate host is a *Pinus*.

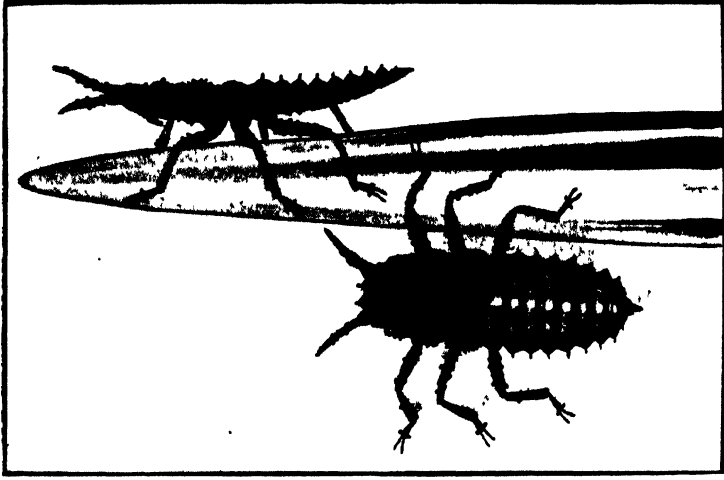
The primary host of *Chermes pini* has not yet been absolutely proved; the intermediate hosts are *Pinus sylvestris* and *Pinus Strobus*, the Weymouth pine. It has been suggested that further research may show *C. orientalis* and *C. pini* to be one and the same, with Spruce as the primary host tree, and *Pinus sylvestris* and *Pinus Strobus* the intermediate hosts. In its life history there would be five generations with an Exile Series in Generation 4, the Exile Series containing in this case, not only wingless adults, but also winged non-migrating adults.

The galls on *Picea* in the case of *C. orientalis* are elongated and cylindrical, the foundress larvæ hibernating on the stem below the bud, the bud-gall being, as a consequence, not so marked. Burdon has found the galls on *Picea orientalis*. Of the above group* of *Chermes* a stage on the intermediate host Scots Pine has

* In the literature apart from the nomenclature of Cholodkovsky, we have for pine-infesting forms the names *C. strobil* Hartig, and *C. corticalis* Kalt.



EGGS OF LARCH *CHIRANES* (greatly magnified).



CHIRANES NEWLY HATCHED FROM EGGS ON LARCH
(greatly magnified).

come to me from Fife, Perthshire, and Yorkshire, and the Colonist stage on Weymouth Pine from Suffolk.

Chermes WHOSE INTERMEDIATE HOST IS *Abies*.

Of the *Chermes* group where *Picea* is the primary host and an *Abies* the intermediate host we certainly have representatives in Britain.

Two separate species are described, and a third mentioned by Cholodkovsky. Colonists, Exiles, and *sexuparæ*, found on Silver Fir by Nüsslin, and described by him in the literature as *Chermes piceæ*, have been determined by Cholodkovsky as respective stages in the life history of *Chermes funitectus* Dreyfus.

This would indicate that in Europe we have at least two *Chermes* species with the normal five generations, the life cycle taking two years. The primary host is a Spruce, on which a gall is made of the *strobilobius* type, and the intermediate host an *Abies*. I have unworked material of the stages on the intermediate host *Abies pectinata*, and the same on *Abies Nordmanniana* and *Abies nobilis*.

The needles of the *Abies* may be deformed and curl up, the tufts of wool attesting the presence of the insect are well marked, and in the case of the bark the white patches are very characteristic.

In order that examples of the different types of life history may be complete, I name here *Chermes viridanus* Chol., described by Cholodkovsky, and mentioned by Burdon. This species is exceptional in its behaviour, inasmuch as it lives entirely on the Larch, the hibernating larvæ becoming winged adults which lay eggs on the larch needles; the larvæ from these eggs feed till the autumn, and in the next summer after four moults the winged generation is reached again.

Damage to the Various Trees.—1. *Spruce*.—Here it is the buds which are damaged. The greatest damage is where the galls are of the *strobilobius* type, and of the *viridis* and *abietis* type. On account of the galls, the normal branching and growth are interfered with. Shoots that would in ordinary circumstances have developed normally are either suppressed, or, remaining weak, perish later on. Shoots that perish may show a marked curvature, and may break later. Besides the asymmetrical development, there is a loss of green assimilative tissue.

C. viridis and *C. abietis* galls may be found on grown trees up to twenty years of age. Young plants especially are attacked, particularly if growing in unsuitable places. *Chermes strobilobius* is not found so commonly on grown plants. Spruce unfavourably situated, or weakened by frost or by the injury of animals, may suffer severely, owing to a great formation of galls. Fortunately, in connection with the

Spruce galls, it is the side-shoots, and not the leading shoots, which are spoilt.

2. *Larch*.—The needles become bent, owing to the sucking of the *Chermes*, and the apical portion of the infested needles may wither away, and the bark is also punctured. When the pest is abundant, the trees must suffer in health. It is young Larch which is attacked, and two quotations may be given from correspondents to show the possibilities of damage: "The Larches are now 15 ft. high, but during the past three years a considerable number have died off; the foliage gradually withers up, and eventually the trees become quite dead. Twigs and bark are covered by the deposit." "Larch of eleven years of age is dying with the white on stem and branches."

The indirect damage owing to the following on of other enemies also deserves notice. Specially interesting in this connection is the possibility of infection by the spores of the Larch-disease fungus (*Dasyscypha calycina*).

The Larch-disease fungus is a wound parasite, the fungus mycelium from the germinated spores entering the tissue of the trees by some kind of wound. Burdon's dissections have satisfactorily proved that one such kind of wound for affording entry to the fungus is that made in the bark by the proboscis of the *Chermes*. Massee * had previously suspected this mode of entry, and as a result of experiment he wrote: "I have repeatedly produced Larch Canker by placing ascospores underneath the foundress." Further, a *Chermes*-infested tree is physiologically weakened, and is thereby less capable of resisting the fungus.

3. *Abies*.—Here, too, the needles may show curvature, and become brown and die. Shoots are also infested, and this, with attack on young shoots and older bark, results in the falling off and, it may be, ultimate death of the plants.

4. *Pinus*.—The same loss of health attaches to the *Chermes* infestation on dwarf shoots, and the bark of twigs and stem.

Treatment.—1. If removal of the galls on the Spruce be attempted, it ought to be practised when the plants are young, and should be done thoroughly. In a garden, at

* *Journal of the Board of Agriculture*, Vol. IX, Sept. 1902, p. 180.

any rate, the destruction of galls would be justifiable, and especially in the case of exotic species.

2. Bark-infesting forms, with a covering of wool, should be treated before infestation becomes widespread (a) by thorough brushing with a bristly besom (*see* Leaflet 140), and (b) by spraying with paraffin emulsion. Very dilute carbolic acid and a dilute watery solution of creolin are sprays mentioned in the Continental literature.

3. Of extreme importance is winter spraying, or spraying when the trees are dormant. Not only can trees in the dormant condition stand a stronger spray, but there is the great advantage that the hibernating forms that will give rise to the new generations of the next year will be destroyed.

Burdon has had great success in attacking hibernating *Chermes* on Spruce with the following * spray:—

"Dissolve 3 lb. of soft soap in 2 qrts. of boiling water; add 1 pint paraffin to the above whilst still boiling, and churn the two together until they form a buttery mass. This stock is then diluted with 5 gals. of soft water." Not only were Mr. Burdon's own experiments very successful, but in a spraying experiment at Kew an emulsion of paraffin and soft soap also had excellent results against Spruce badly infested with *Chermes*.

Used at the end of March, before the buds had burst, Burdon also proved the success against hibernating *Chermes* of a solution of soft soap in the proportion of 1 lb. of soft soap to 1 gal. of soft water.

FARM ACCOUNTS.

JOHN O. PEET, B.Sc.

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There is a widespread belief that farmers as a class do not keep systematic accounts of their business, but information collected from a large number of farmers shows that a considerable and increasing proportion, including practically all the leading farmers, do keep accounts of some kind. In many cases a cash account and a diary are the only books regularly

* "A remedy for the Spruce Gall and Larch Blight Diseases caused by *Chermes*," by E. R. Burdon, M.A., F.L.S., in the *Journal of Economic Biology*, 1907, Vol. II, pt. 2, p. 65.

kept, though a labour book may be added on the larger farms; in others, one of the many useful farm account books now on the market is used and is regularly entered up, whilst several instances have been met with where the farmer, although he has had no instruction whatever in book-keeping, has devised quite a useful system, so well adapted to his needs that it has not been thought advisable to suggest any change. Farmers whose affairs are investigated in the Bankruptcy Courts have rarely kept accounts of their business; but such cases can scarcely be taken as an indication of the general practice followed by more successful agriculturists.

Advantages of Keeping Farm Accounts.—The advantages accruing to the proprietor from well-kept accounts of his business are widely recognised. It may be well, however, to enumerate a few of the most important of these in the case of a farmer.

(1) The farmer's dealings are recorded and presented in a clear and methodical form.

(2) Accounts of debts owing or receivable are shown. For large farms this is most important, and also on all farms where a retail trade is carried on. On small or medium-sized holdings the number of sales or purchases on credit is small, and the period for payment is short, except in cases where there is a dairy or poultry business, so that records of credit dealings, beyond those supplied by entries in a diary or note book, are not so necessary.

(3) Attention is directed to excessive expenses or to possible economies. Small items often amount to a considerable total, and this attracts attention in a way the individual items would fail to do. In this connection it may be doubted whether many farmers, except those who keep regular accounts, have any definite knowledge in regard to the amount of their private expenses or cost of living. Their business and private monies are rarely kept separate, and in many cases what is left over after both business and private expenses have been met is looked upon as representing the whole of the profits from farming. Undoubtedly, many farmers are securing larger profits than they themselves recognise, owing to their private expenses being in excess of what they estimate.

(4) A record of expenses which can be claimed by the

farmer on quitting his holding is provided. Even without systematic accounts, receipts for payments on behalf of manures, feeding-stuffs, and such improvements as can be claimed for, may be filed for reference, and thus supply information necessary for drafting a claim. But information in regard to home-grown produce consumed on the holding cannot be supplied in this way.

(5) A statement of the actual profit or loss on the business as a whole is furnished, and a more or less exact one of that realised on the various departments. If the source and amount of the profits and losses are known, there is a possibility—almost a certainty—that the farmer can so develop the more profitable branches and reduce the less remunerative ones as to show, under similar conditions, an improved balance in the future.

What Books to Keep.—No set of books or system of book-keeping can be recommended as the best for farmers under all circumstances. Much depends upon the size of the holding, the class of business carried on, whether there is any retail trade in such things as milk or other dairy produce, or poultry, and, lastly, upon the capabilities of the farmer himself and the amount of time and labour he is willing to devote to accounts.

A Simple System.—One of the principal points which has retarded the general adoption of book-keeping on small farms is the amount of clerical work involved. For such holdings, where the farmer usually works with his men, a very simple system is desirable, one which requires few books or different places of entry. Methods similar to that recommended by the judges of the Royal Agricultural Society's Farm Book-keeping Competition in 1883 are well adapted for such cases. A short description of the books to be kept is given below.

(1) *Diary.*—A diary for daily notes of cultivations, manures applied, crops sown or harvested, quantities threshed, foods consumed, and any observations the farmer may think worthy of being recorded. Columns are provided for daily receipts and payments, and also a form for labour account. The whole of the entries for the day, however varied in character they may be, are made in this book. The following is an example of the form, but the space allotted to each day's entries would, of course, be much greater.

DIARY.

Date.	Received	Paid	Date	Received.	Paid.
Brought forward			Brought forward		
Saturday			Wednesday		
Sunday			Thursday		
Monday			Friday		
Tuesday					
Carried forward					

LABOUR ACCOUNT.

[illegible]

(2) *Cash Analysis Book*.—This is a book to which receipts and payments are transferred from the diary and entered in columns to their proper accounts. Any number of columns may be provided; one should be allotted to each class of stock, produce, or other items of which it is desired to keep a separate record, as in the example on the next page. Debts owing to the farmer at the end of the year are included because they belong to the current year's accounts, and influence the amount of profit and loss; while those owing to him at the beginning and received during the year are deducted, as they have no bearing on the results of the year's working. *

CASH ANALYSIS BOOK.—RECEIPTS PAGE.

Date.	From whom received and particulars.	Total receipts.	Cattle	Sheep	Dairy	Poultry	Corn Crops	Hay.	Sundries
	At end of year								
	Add debts receivable								
	Deduct debts receivable at beginning of year								
	Total sales for the year								

CASH ANALYSIS BOOK.—PAYMENTS PAGE.

Date	To whom paid and particulars	Total payments	Cattle	Sheep	Seeds	Foods.	Manures	Rent, Rates, Taxes &c	Labour	Sundries	Household Expenses
	At end of year										
	Add debts payable										
	Deduct debts payable at beginning of year										
	Total payments and expenses for year										

Profit and Loss Account.—The Profit and Loss Account is prepared at the end of the year, after a valuation of stock, as follows :—

PROFIT AND LOSS ACCOUNT.

To Valuation of live and dead stock, til- lages and unexhausted improvements at be- ginning of year ... To Payment and Ex- penses from Analysis Book, viz.: Cattle Sheep Seeds Foods Manures Rent, rates, taxes, &c. Labour Sundries	By Sales from Analysis Book, viz.: Cattle Sheep Dairy Poultry Corn crops Hay Sundries By Valuation of live and dead stock, til- lages and unexhausted improvements at end of year
To Balance—profit for the year	

Household expenses are not entered in the Profit and Loss Account; they have no bearing on the profitableness of the business.

The system of accounts just described has the advantage of being easily understood and little liable to errors. Although it does not show even the approximate profit or loss on the different branches of the business, it presents in a concise form the materials from which, with a little study and trouble, a very close estimate of these may be made in the case of a small farm. It may be recommended to those farmers who have not previously kept accounts, or who have a disinclination for books. The Royal Agricultural Society publishes ruled account books for a similar system.

A Fuller Method.—A fairly complete and decidedly useful set of accounts may be kept without a large amount of labour by means of a cash book, a ledger, and a labour book. Although these are mentioned here as three distinct books, they may, for convenience, be bound in one volume. The cash book serves for the record of receipts and payments. Accounts are opened in the ledger for all the various crops, kinds of stock, and classes of expenses of which it is desired to keep separate account, in order that the approximate profit or loss resulting from each may be known. A useful list of such accounts as are generally desirable appeared recently

in this *Journal* (Vol. XV, p. 402); their number and character will vary, however, according to the class of farming carried on, and each farmer must decide for himself what accounts to open. Each account is debited with the value of that particular class of stock in hand, or, in the case of crops, with that of cultivations, seeds sown, &c. All receipts appearing in the cash book are carried to the credit of their proper ledger accounts and the payments to their debit. At the end of the year the value of stock in hand, or sold but payment not yet received, and of cultivations, is placed to the credit of the accounts, and that of purchases not yet paid for to their debit. The balance, gross profit, or loss, is transferred to Profit and Loss Account.

Except on farms where there are numerous credit sales, it is unnecessary to open accounts with each person or firm with whom business is done. The large number of personal accounts which appear in most published examples of farm book-keeping form one of the main causes of the apparent complication of the systems advocated. As already mentioned, where the credit dealings are few, the records in diary or note book are sufficient for them. In other cases it is necessary to enter them in a day book and to transfer them to personal accounts in the ledger, preferably a ledger kept specially for them.

The labour book serves for the record of the labourers' time and employment and of the wages paid. Amounts of wages to be entered in the various ledger accounts are obtained from it. It is also the best place for entering notes of observations which the farmer may think worthy of being recorded with a view to their use for future reference. Such notes are often extremely useful; they tend to mature one's experience more quickly and certainly than mere mental observations.

When and how to Commence Farm Accounts.—The correct time for a farmer to commence his farm accounts is when he enters upon the business of farming. All is then straightforward as regards opening the books. He begins with a certain amount of cash, which he enters as a receipt in his cash book. His payments for live and dead stock, cultivations, &c., are duly entered and posted to their proper ledger

accounts as these are opened. The best time for one already in business to commence systematic book-keeping is the usual date at which farm tenancies commence in the district. In this case the first step is a valuation of everything connected with the business, and the entry of the values in their respective ledger accounts.

A simple valuation at the close of each year is essential if the accounts are to show the true financial position of the farmer, or the profit or loss on particular departments. It is of the utmost importance that as exact an estimate of the values as is possible be secured. There is a difference of opinion, however, as to whether the ordinary live stock of the farm should be valued in accordance with the fluctuations of the market at the prices prevailing at the time, or whether they ought to be valued each year at the same price per head for stock of a similar class and age. The former method shows the value which would be realised if the stock were sold, but, even in a time of inflated prices, they cannot be disposed of, as they are required for carrying on the business. In such cases this method may show profits which are not actually secured, while in a period when low prices prevail it may indicate losses which are not really sustained. Valuation at a regular and medium price per head is on this account to be preferred. It gives more exactly the profit actually realised under the circumstances, so long as the quality of the stock remains practically unchanged, and it has the advantage of being less troublesome. In the same way the whole of the machinery and implements need not be valued individually each year. If, say, from 10 to 15 per cent. of the value of these, according to whether there is little or much expensive machinery which decreases rapidly in value, is written off each year as depreciation, the result will in most cases not be far wrong. A valuation in detail may be made after an interval of a few years, to check the correctness of the allowance and to furnish the correct percentage to be allowed in future.

Profit or Loss on Various Departments.—The advantage to a proprietor of a knowledge of the exact results, as regards the profitableness or otherwise, of the various departments of his business, is evident, and requires no demonstration.

Manufacturers fully appreciate this, and those who produce a variety of wares keep cost books, in which each class of stock produced is debited with—

- (1) Cost of all materials used;
- (2) Wages paid to workmen;
- (3) A proper proportion for rent, supervision, interest on capital, and profit.

By this means the manufacturer learns the exact cost of his wares, knowledge which is essential to him if he is to conduct his business successfully. Knowledge of the exact cost of producing the things he sells would be just as useful to a farmer, and can be obtained by him in a similar manner, though not with quite the same degree of accuracy because of the influence which the departments have upon each other. For example, the action of some purchased manures, as well as dung, extends over several years, and benefits many crops, and it is difficult to fix the amount which should be charged to the crops of a particular year; while in the case of foods the total cost cannot be charged to the stock which consume them, for crops benefit from their manurial residues. These difficulties, however, can be overcome, but the amount of clerical labour it involves is apparently more than many farmers are inclined to devote to it, though there can be little doubt that it would be greatly to their advantage to adopt such a system. Very few farmers at the present time attempt it, and we have frequently had the remark made to us by a farmer that a particular branch of his business—say, milk production—was probably far more profitable than others in which he engaged, and might with advantage be extended, but that he had no means of knowing the fact definitely, and was deterred from attempting such a system of accounts as would enlighten him, by its complexity and the amount of time and labour it required.

The two systems of accounts described in this article furnish the actual profit or loss on the whole of the farming business for the year; they also supply data from which, with a little trouble, a rough approximation to the profit or loss on the various departments may be obtained. Either of them may be extended so as to yield a return of the actual profit or loss on the different branches. For this purpose

it is necessary to keep, in addition to the accounts already mentioned, the following records:—

1. Distribution of feeding-stuffs, whether concentrated or bulky, purchased, or home-grown, so as to show the amounts consumed by the different classes of stock.

2. Stocking of pastures and use of grass keep.

3. Distribution of seeds and manures.

4. Employment of labour, both horse and manual, and the wages paid; the record kept in such a form that the expenditure on behalf of the various accounts is shown. The labour sheet shown in the diary described in the early portion of this article is insufficient here. The daily record requires to state the employment of each labourer, or at least the account on behalf of which he has been engaged, so that at the end of the week, after the wages are paid, the amounts may be entered to their respective accounts in a wages analysis book.

With the exception of the labour book, these records do not necessitate frequent entries. The form in which they are kept will depend upon the division of the accounts. For example, if the live-stock accounts comprise only one for cattle, one for sheep, and one for pigs, the record for feeding-stuffs and grazing will be fairly simple. If, however, each of these is divided, as is desirable, into breeding stock, store stock, and fattening stock, the record becomes more complicated and troublesome to keep. Similarly, with seeds and manures, if only one account is kept for arable land, the record is little trouble, but this is much increased if an account is opened for each kind of crop grown.

At the end of the year, with the aid of the above records, the expenses are distributed in proper proportion amongst the departmental accounts. Thus, the expenditure on feeding-stuffs is distributed amongst the live-stock accounts; that on manures and seeds amongst the arable and the meadow-land accounts; wages and cost of horse labour amongst all the accounts on behalf of which work has been done; rent, rates, taxes, and insurance amongst both live-stock and crop accounts, and so on with the various expenses.

In the case of stock being transferred from one account to another—say, from store to breeding or fattening stock—an adjustment is made, the account from which they come being

credited and the other debited. A similar adjustment is necessary for the manurial value of foods consumed, the crop account which benefits being debited and the live-stock account credited.

The extent to which these transfers and adjustments must be made will depend in each case on the character of the farm and the produce dealt in, but the principle is the same throughout, the object aimed at being to charge to each separate branch of the business for which an account is kept the whole of the direct and indirect expenses which it involves or from which it benefits, and to credit it with its due proportion of the receipts, so as to ascertain the real profit or loss on that particular branch.

THATCHING.

J. C. NEWSHAM.

Hampshire Farm School, Basing

The village thatcher is still a familiar figure in many of our rural districts. In this typical village of Old Basing, for example, grandfather, son, and grandson may be seen busily engaged in rick-thatching. Some writers would have us think that the present-day thatcher is behind his predecessors as regards the skill and excellence with which this particular branch of farm industry is performed; but I am confident that this is not the case: where such incompetency does exist, I have little doubt that the farmers themselves are often to blame, inasmuch as many of them do not afford their men an opportunity of practising thatching. As a rule they place their whole trust in the "local expert," who is regarded as having mastered some mystic art. This may naturally be regarded as a justifiable course, for many farmers would be loath to allow their inexperienced farm hands to practise upon corn-ricks for fear of having them injured. A competent man, however, can generally be selected to commence upon a straw stack, when, with a few hints from the master and a certain amount of natural aptitude for work of this nature, he will soon become proficient. Subsequent to harvest time, the local thatcher is a hard-pressed individual, and a long period may elapse before his services can be requisitioned. In the meantime the unthatched ricks are at the

mercy of the elements, and, should a wet season be experienced, the damage resulting may prove considerable.

It would therefore be far more satisfactory to have the thatching completed as soon as the ricks are in a fit condition; even if the work is not accomplished in the most expert manner, sufficient protection will be afforded to prevent damage by rain.

Substitutes for Thatching.—There are many substitutes now in use for purposes of thatching—the erection of Dutch barns, for instance. The latter have done much towards reducing the anxiety of the farmer when storing hay and cereal crops during the showery weather which is so frequently experienced in Scotland, Ireland, and the northern counties of England. Even the South of England has not been exempt during the past season, and many half-erected hay-ricks have been left exposed to continuous rains; whereas, had a Dutch barn been available for the storage of the finer qualities of meadow hay, the saving would have been considerable.

How to Learn Thatching.—A knowledge of thatching, like that of any other branch of farm husbandry, cannot be gained without careful observation and continuous practice, but there is no reason why the youngest hand on the farm should not attempt the thatching of straw ricks as a means of offering a beginning to the more important work of thatching corn ricks.

Outfit and Materials.—The thatcher's outfit is neither an expensive nor a large one; it consists of a bill-hook, a pair of sheep shears for trimming the eaves, a large forked stack to hold the drawn straw or yealms, and a wooden hand-rake with iron teeth. The principal materials necessary for thatching purposes are straw, reeds, and heather, according to the purpose for which they are intended. Oat and barley straw are only serviceable where the corn so covered has not to remain in the rick for any considerable length of time; well-grown stiff wheat straw will answer all general purposes on the farm, but for more lasting purposes, rye straw or reeds are to be preferred, heather being mostly used for ornamental thatching—as, for example, model dairies, cricket pavilions, summer houses, &c. Other requisites necessary for thatching are a ladder sufficiently long to reach the

ridge of the stack when laid perfectly level with the roof, a quantity of pegs, binding cord or oakum, a paring knife and shears for trimming the eaves, a suitable wooden mallet or other implement to drive in the pegs, and a running noose to convey the yealms of straw to the thatcher.

Preparation of the Straw.—The preparation of the straw is of more importance than many people imagine. If straw of a dry, loose character is used, it cannot be packed so tightly and securely as damp straw; for this reason the straw should be well doused with water and turned over with a fork so that it becomes thoroughly moistened. The heap must then be slightly compressed by beating with the fork or treading. This has the effect of ridding the straw of flag and shack, the presence of which tends to arrest the flow of water.

Yealming.—The straw should be drawn from the bottom of the heap where the pressure is greatest. The usual method is to grasp as much straw as can be gripped by both hands, the two being held close together. The straw is then drawn out by a quick movement of the arms towards the right, followed by a swing over to the left, finally laying the yealm at the worker's feet, the thickest end being to his right-hand side. The work of yealming is usually undertaken by the thatcher's assistant or server, and it is astonishing how rapidly some men can perform the work.

When a sufficient quantity of this partially straight straw has been collected, the yealmer works through it, using his fingers so as to regulate it and to remove any loose portions, at the same time drawing the bundles closer to his feet, until the layer amounts to as much as he can hold in the grip of both hands. A yealm having been thus formed should never be broken, but kept firm and secure until placed on the stack. As the yealms are completed, they are placed crosswise on a short rope or cord, the thick and the thin ends alternating. When of sufficient number and weight for a man to carry, the rope, which should have a running noose, is drawn round the yealm, the latter being in this way conveyed to the rick.

A common practice in the South of England is to place the drawn straw direct in the fork, which, when fully charged,

is carried to the rick, and the straw so conveyed to the thatcher. There are others who draw the straw dry and lay it on a board, after which it is damped, trimmed, and straightened out, being finally separated into yealms, which are bound up in straw ropes.

Preparation of Stack.—In commencing to thatch a rick, the thatcher first prepares it by filling up any hollows with loose straw and levelling down humps in the roof in order to secure a firm, even surface. As the rick will probably have settled down, the top will require bolstering up with a "dummy," or tight-tied bundle of straw. Having now made the roof firm and even, the straw can be laid on.

Windy, gusty weather is very unsuited for the thatching of ricks, as the thatch is being constantly disturbed and ruffled up by each succeeding gust of wind. Perhaps the most opportune time for commencing this work is when the weather is somewhat damp, for the straw is none the worse for being slightly wetted. Moreover, under such conditions, the work of carrying in the corn is generally at a standstill, and so there is ample leisure for completing the thatching of the ricks which have already been erected. Of course, it would be highly improper to thatch in very wet weather, as the topmost sheaves would then be covered up while still wet with rain.

How to Commence Thatching.—The ladder should be so placed that it lies flat on the rick; the work should then commence at the bottom, or eaves, the straw being meanwhile packed as firmly and securely as possible. When the top is reached, the straw is laid well up to form a point, thus affording a good pitch for the water to run off. In general practice, the eave-line of the stack is laid with a double thickness of straw, in order to provide a projecting eave which will shoot the water off the stack without injuring the sides. The actual operation of laying the yealms of straw upon the stack is quite simple, and very much resembles the slating of a roof. It must be borne in mind, however, that great importance attaches to the insertion of the thin ends of the yealms under the roof of the stack; this makes them doubly secure, and ensures an even and permanent thatch. The ~~page~~ which are driven in the thatch must be inserted in a

horizontal direction, not vertically; in the latter case they easily convey water into the interior of the stack, which, of course, has a decidedly injurious effect. When laying the yealms alternately, one overlapping the other, the expert thatcher will keep them damp by sprinkling with water, meanwhile combing the straw with a thatcher's rake to make it lie perfectly even; he will then beat it down lightly but firmly so as to consolidate the whole roof into a regular thatch of uniform thickness throughout.

*A medium coating of straw well laid invariably resists water much better than a larger quantity of straw badly placed together. When thatching hipped-end stacks, it is customary to commence about the centre of one side in order to ensure a good finish; gable-end stacks are usually commenced at one end. The width of stack capable of being covered without moving the ladder will depend on the thatcher's reach, but this must not be exceeded beyond comfort, for when the thatch has to be packed in at arm's length it can never be done so firmly and securely as when a shorter stretch is taken.

Pegging and Cording.—To keep the thatch in position, pegs made of split hazel, willow, oak, or other tough wood are used. These should be cut into lengths of from two to three feet, with the ends pointed. Any knots must be shaved off so that the pegs may be pushed easily into the stack. Split hazel rods are often made to take the place of cord between pegs, an arrangement which certainly has a very ornamental appearance; for general purposes, however, oakum or binding cord is used. As the work of laying the yealms proceeds the pegs should be inserted in a horizontal direction as before mentioned, and the cord secured thereto. The elaborate roping or cording of ricks is not practised so extensively at the present day as it was some years ago; few farmers keep their grain in the ricks for more than two years, while with the majority, under twelve months is the usual time. If thatching is done with good, well-drawn wheat straw, well packed upon the roof of the rick, there should be no need for the elaborate methods of pegging so frequently seen in some districts.

Trimming the Eaves.—The overhanging eaves of the stack

must be pared or trimmed off. This is done by means of the paring knife, the sheep shears being subsequently used in order to trim off any rough edges and projecting straws, and to impart a smart finished appearance to the stack. The greatest importance is attached to the trimming off of the eaves: if this is done well, the under-surface of the eave will present a horizontal or even a slightly rising appearance, and the water will consequently shoot clear of the stack; but if the shears are used incorrectly, and the eave appears sloping downwards, water will surely find its way into the stack. *

Labour and Expense.—Working single-handed, a man should complete five “squares” in a day of ten to ten and a half hours. With two men working, this amount would be doubled. A “square” represents a hundred square feet. The usual cost of thatching a square amounts to 11d. or 1s., while for straw ricks this amount may not be more than 9d. Hazel rods may be purchased for 5s. per 100, with 25 rods in a bundle, and two bundles will generally be found sufficient to complete the thatching of ten “squares.”

THATCHING OF DWELLING-HOUSES, &c.

A thatched roof has a picturesque appearance, which is by many preferred to the grey slate or red tiles which top the modern country cottage, while this method of making roofs watertight is adopted to a considerable extent in the case of summer houses, pavilions, arbours, &c. Different localities have different methods of thatching, but the following may be taken as most suitable for general practice.

Preparation of Straw.—Straw is the most usual medium for thatching houses, and it is employed in one of two methods—firstly, by laying a covering of fibrous turf over the roof and pushing the straw through the turves; or, secondly, by sewing the straw directly to the roof.

The material must in all cases be prepared beforehand, this work affording a very suitable occupation to be carried on during wet weather under cover. The straw is simply drawn from the heap in the manner which is described above, the only exception being that more care is exercised to exclude all short ends or pieces of straw, so that, when properly prepared, it will be perfectly straight.

Making the Staples.—The yealm of straw is then gathered in the hands and a small quantity is pulled out at one end, turned down, and wound round the top of the yealm, forming what is known as a "staple." The projection thus formed at the head of the staple prevents it from being withdrawn once it has been inserted in the turves. When prepared in this manner, the staples are bound together a dozen at a time and stored in a dry place until required for use.

Preparation of Roof for Thatch (First Method).—The joists are fixed on to the roof in the usual manner, wooden runners being nailed on at about six inches apart; these runners are about three inches broad. The turves are placed upon the roof, working from the bottom and proceeding in an upward direction as with slates. When cutting the turves, a curved cutting-iron must be used, so as to obtain turves thick in the centre but gradually tapering off towards the sides. Thus, when laid on the roof, the overlapping edges will be so arranged as to preserve the uniform level, and the roof will be of one thickness throughout.

Laying the Staples.—A thatching iron now becomes necessary. This implement is slightly forked at the apex in order to catch the twisted head of the staple of straw. In this manner the latter is pushed through the turf, and is prevented from coming out again by the "head" of wound straw. The work of laying the staples must be commenced at the eaves, and should proceed upwards until the ridge is reached; at this juncture a layer of turves is placed over the straw in order to form a "bolster" or well-defined ridge, and the thatching is then complete.

Preparing the Roof for Thatching (Second Method).—When preparing the roof for the second method of thatching, namely, sewing the straw directly to the roof, the joists are laid, the wooden runners nailed on, and the straw prepared in the same way. The straw is then sewn directly to the wooden runners, commencing at the bottom and working upwards to the ridge. Sewing twine is used for this purpose, and the work will be found quite a simple operation after a little practice has been obtained. In order to finish off the ridge, turves may here again be requisitioned as in the former method, or, as an alternative, two pieces of wood

may be utilised. In the latter case, the boards should be cut to the same length as the roof and fixed in the fashion of a triangle, overlapping the thatch for some distance on each side. This method of thatching is perhaps most extensively practised, as it is often impossible to obtain good, firm, fibrous turf.

Thatching with Heather and Reeds.—In certain districts heather is used extensively in the thatching of dwelling-houses, and particularly rustic summer houses, and similar buildings. This material is, of course, not always procurable in abundant quantities, but in the north and central counties of Scotland it forms the staple medium for thatching purposes. When carefully cut, heather will require but little preparation beyond straightening out. The roof is prepared as in the case of straw thatching (second method), and the heather sewn fairly tightly and closely together. This makes an excellent and very durable roof. Rushes, where they are procurable, are also a most valuable material for thatching purposes. They are used in a similar manner to straw, being either sewn direct to the roof or inserted through turves. Broom is used extensively in other districts in a similar manner to heather thatching.

Cost of Thatching.—The cost of labour for thatching dwelling-houses, &c., generally amounts to 4s. 6d. per "square," or hundred square feet, while reeds cost as much as 5s. per square. On the roof of a dwelling-house, ten bundles, or 5 cwt., of straw will be required to each square of thatch, and one hundred of these bundles will cost approximately 105s. When thatching is carried out in a thoroughly expert and experienced manner, the roof will remain quite watertight for about thirty years if composed of the finest quality wheat straw, or for forty years if reeds are employed. If, however, the work is done in an indifferent manner, it may not last for more than ten years.

IMPORTS OF GRAIN IN THE CEREAL YEAR 1908-9.

The most important feature of the past cereal year (1st Sept., 1908, to 31st Aug., 1909) has been the high price of wheat, together with the good average prices obtained for barley and oats.

The average price of British wheat, as ascertained under the Corn Returns Act, has stood above 30s. per quarter since the week ending May 23, 1907, and during the two weeks ending August 7th and 14th, 1909, it reached 44s. 9d. per quarter. The average for the harvest year 1908-9 is 36s. 6d., which is a higher figure than has been reached in any year since 1883. It differs but slightly, however, from that of 1897-98, which stood at 36s. 2d. per quarter. The average price of imported wheat was 39s. 1d. per quarter, as against 36s. 1½d. in 1907-8 and 30s. 5d. in 1906-7.

English barley averaged 26s. 11d. per quarter, which is the highest since 1897-8, while oats at 18s. 10d. were also above the average in the previous six years.

The table below shows the average prices of British wheat, barley, and oats per quarter, as ascertained under the Corn Returns Acts in each of the harvest years ending 31st August since 1898. The quantities given in the table are the quantities returned as sold, from which the averages are calculated:—

Harvest Years.	Prices per quarter.			Quantities sold at certain markets.		
	Wheat.	Barley.	Oats.	Wheat.	Barley.	Oats.
1 Sept- 31 Aug	s. d.	s. d.	s. d.	Quarters.	Quarters.	Quarters.
1897-98	36 2	26 11	18 3	2,534,224	3,339,842	599,666
1898-99	26 0	26 1	17 3	3,498,515	3,629,760	777,676
1899-1900	26 4	25 2	17 4	3,255,654	3,355,241	722,859
1900-01	27 1	25 0	18 1	2,463,341	3,109,149	684,956
1901-02	28 4	25 11	20 4	2,451,275	3,176,599	698,840
1902-03	26 5	23 4	17 8	2,386,017	3,151,337	1,104,660
1903-04	27 2	21 10	16 4	2,129,448	2,780,473	1,132,086
1904-05	30 7	24 6	17 0	1,746,927	3,141,058	1,178,154
1905-06	28 9	24 2	18 5	2,940,263	3,202,613	940,015
1906-07	28 1	24 5	18 4	2,830,991	3,376,615	1,219,419
1907-08	32 9	25 8	18 2	2,944,256	3,564,908	1,530,848
1908-09	36 6	26 11	18 10	2,962,825	2,972,889	1,054,318

The high price of wheat, however, appears to have had but little effect on the imports, which amounted to 21,727,000 quarters, as compared with 21,363,000 quarters in 1907-8. The variation in the home harvest almost adjusted the difference between the two years, so that the total supply of home and imported wheat was practically the same both in 1908-9 and in 1907-8, viz.: 28,468,000 quarters, as compared with

28,429,000 quarters. The quantity of imported wheat meal and flour was, however, less in the year just ended, and only amounted to 10,969,000 cwts., as against 13,389,000 cwts. If these figures are converted into the weight of grain which the flour may be supposed to represent and added to the above totals, it will be found that the total quantity of wheat available for home consumption, including seed, but exclusive of stocks carried over, was 32,023,000 quarters, as compared with 32,768,000 quarters in 1907-8. The figures for the past six years are compared in the following table :—

	Quarters.
1903-4	34,030,000
1904-5	32,796,000
1905-6	34,283,000
1906-7	33,966,000
1907-8	32,768,000
1908-9	32,023,000

It will be seen that, notwithstanding the increase in the population, the supply during the past year fell below that of any of the preceding five years.

With regard to the countries contributing to the supply, the receipts from each of the principal sources are given below :—

Country of Export.	Thousands of Cwts.			
	1908-09	1907-08.	1906-07	1905-06
India	10,904	10,480	14,613	11,743
Russia	9,470	4,455	12,843	18,377
Argentina	24,542	28,128	22,179	22,890
United States	19,290	25,273	20,319	17,917
Canada	15,118	13,578	11,085	11,177
Australia	9 587	6,264	7,769	7,488

The Argentine Republic was the principal exporter to this country, the United States taking second place, and Canada the third. Australia sent a larger amount than had been the case for several years. Roumania, which in some years contributes a few million cwts., sent a very small supply, and the only country other than those mentioned in the above table which furnished more than one million cwts. was Chile.

As regards flour, the United States contributed 6,997,000

cwts., while Canada sent 2,056,000 cwts. The imports from Austria-Hungary, at one time a considerable exporter, were insignificant.

While the home supply of wheat only represents about 25 per cent. of the total, home-grown barley and oats still furnish the bulk of the supply.

In 1908 the yield of barley in the United Kingdom was 7,696,000 quarters, while the imports were 6,152,000 quarters (of 400 lb.), and in the preceding year the figures were 8,387,000 quarters and 4,890,000 quarters respectively. In the case of oats, the proportion of the home produce is much greater, 22,001,000 quarters being grown in 1908, and only 5,559,000 quarters imported, as against 22,961,000 quarters in 1907, and an importation of 4,746,000.

The receipts of barley during the past year from abroad were somewhat larger than in 1907-8 owing to increased exports from Russia and the United States, while as regards oats there was also some extension.

The imports of maize, on the other hand, were barely equal to those of 1907-8, and represent a lower figure than in any year since 1894-5, when the imports only amounted to 24 million cwts. Russia, Roumania, and the United States were all comparatively small contributors, though the supplies from the Argentine Republic were fairly good.

The aggregate imports of the principal cereals in each of the past 12 years are given below :—

Harvest Year.	Millions of Cwts.				
	Wheat.	Wheat-flour.	Barley.	Oats.	Maize.
1908-9	93'1	11'0	22'0	15'5	39'0
1907-8	91'6	13'4	17'5	13'2	39'5
1906-7	94'7	13'2	19'5	10'9	51'7
1905-6	94'6	14'4	20'3	16'0	47'1
1904-5	105'1	10'9	21'0	17'2	42'3
1903-4	93'1	19'1	31'9	15'2	47'6
1902-3	85'1	19'2	25'7	16'6	41'6
1901-2	74'7	19'1	23'1	16'7	47'2
1900-1	71'2	23'3	18'7	22'1	55'8
1899-1900	65'0	21'6	15'2	19'8	57'7
1898-9	67'0	22'9	22'9	14'9	57'5
1897-8	66'4	20'0	20'3	15'4	55'6

It will be seen that, except in the case of wheat, practically

no expansion in the supply has taken place during the past few years, the imports being either more or less stationary, or, as in the case of flour, maize, and oats, actually less than in earlier years.

NOTES ON INSECT, FUNGUS, AND OTHER PESTS.

During the past month three more cases have been reported which suggest the presence of the pigmy mangold-beetle (*Atomaria linearis*). The first was from Aylesbury, where half an acre of mangolds was reported as destroyed. The pest enclosed was the millipede *Julus pulchellus*, but the appearance of the plant sent suggested an attack by the beetle. The second case occurred near Honiton, and the damage was at first attributed to rooks. The third case came from Coppleshone, in N. Devon, the millipede being again suspected. In no case was the beetle itself sent, and the cases rest on suspicion only.

Early in July a specimen carrot taken from a badly infested bed was forwarded to the Board from Brighton. It was stated that the carrot, on being pulled, appeared to be perfectly sound, though a little flabby and decayed at the tip. Examination showed it to be infested with aphides, which were present in large numbers, and from which more than a score of hymenopterous parasites have been since bred. The writer stated that the infestation was very common in the neighbourhood of Brighton.

Specimens of leeks from Hamilton were attacked by an *Anthomyid* fly, the larvæ of which closely resemble those of *Phorbia cepetorum* (Leaflet 31), and the maggots of that fly were sent up from Bebington, Cheshire.

Two cases of a remarkable disease of beans, which has completely baffled investigation, have also been submitted to the Board. The first report came from North Bute parish, in the Isle of Bute. The plants were said to look healthy, and promised a good crop until the end of July, when they ceased to grow, and subsequently turned black, and apparently decayed. The second case occurred near Wokingham, where a field of ten acres, well manured, produced excellent flowers but no pods. The soil was medium clay, and the beans

followed wheat. The form of the disease is not unfamiliar to the Board's advisers, and cases occur from time to time; but no trace of any fungus disease can be found, and though in both cases several specimens of Thrips, parasitised aphides, and some other insects were found, nothing sufficient to account for the damage could be traced. The Board would be glad to hear of other cases in order that an investigation may be made.

To the cases of attack of Pear-leaf Blister-mite, recorded in the *Journal* for June, 1909, p. 210, must be added reports from Newport (Salop), Hampton-on-Thames, Devizes and Staple-grove, near Taunton.

A correspondent from Newburgh, Fife, sent some specimens of leaves of apple, plum, and cherry trees, badly mined by the larvæ of *Cemistoma* or *Leucoptera scitella*, a small Tineid moth that attacks various rosaceous trees. The pest appears to have been introduced some years ago with some young apple trees. It has become worse each year until at the present time the leaves all fall off, and the crop fails. Spraying with arsenate of lead had naturally failed, but as a number of cocoons were attached to the leaves sent the damage might possibly be mitigated if all infested leaves were promptly destroyed.

A large number of the specimens sent to the Board during the past month have related to forest trees. A correspondent from Elveden, Suffolk, sent some caterpillars of the Buff Tip moth (*Pygæra bucephala*) which were infesting the oaks in that neighbourhood, and doing much harm. Some white poplars, about 15 feet in height, in Canobie, were observed by another correspondent to be attacked by the larvæ of the poplar beetle (*Melosoma populi*). The pest is rare in Scotland, and seems to have been introduced from the nursery whence the trees were brought. The larvæ feed till August, when pupation takes place, the pupæ hanging from the leaves. Spraying with arsenate of lead is suggested as a remedy in the spring, but in general the beetles can be shaken or jarred off the trees and collected. From Bemerton, Salisbury, specimens of willows attacked by a fly, *Cecidomyia rosaria*, were sent. The infestation was observed to be only on the north and west of the trees, but they were few in

number. The destruction of the galls in which the pest is pupating would help to reduce the attack next year. At Leighton, Welshpool, a plantation of Sitka Spruce, some 18 acres in extent, and only formed last year, was attacked by the clay weevil, *Otiorhynchus picipes*. No information was sent as to the amount of damage done, but the Board were informed that the insect was easily trapped under sods. In the neighbourhood of Cemmaes, and elsewhere in N. Wales, damage to larch from the Larch Miner moth (*Coleophora laricella*) is reported to be easily seen, though it often appears trifling compared with the damage done by *Nematus Erichsoni*. The damage in the Lake District is also very marked. These small caterpillars, which attack other trees as well as larch, are usually hatched about July, and feed till October, when they hibernate in their cases till April or the beginning of May; they then resume feeding for a few weeks, pupating in May, and becoming moths in June.

The most interesting of the fungus pests forwarded for investigation was found on some leaves of Cox's Orange pippin, grown at Aspull, in Suffolk. The disease had been noticed in previous years, but had not been reported, and seems to have spread. The leaves were blotched by the fungus *Cladosporium herbarum* Link., an exceedingly common saprophyte, which, under certain conditions, becomes parasitic, and injures living plants, especially if these are weakened by weather or other unsuitable conditions. The foliage of many apples is liable to attack, and Cox's Orange pippin often suffers severely. Treatment with dilute Bordeaux mixture in the spring would probably check the development of the spores.

Wheat sent from St. Fagan's was badly affected by yellow rust (*Puccinia glumarum*), dealt with in this *Journal* in July, 1908, p. 241.

Tomatoes from Tovil, Maidstone, were severely attacked by a fungus disease, apparently *Phytophthora infestans*, though in the absence of fruiting mycelium this could not be stated definitely. Tomatoes in Kirkmuirhill showed marks of *Cladosporium fulvum*, but the attack was very slight.

The Board of Agriculture and Fisheries have on several occasions drawn attention to the importance of using pure sulphate of copper when making Bordeaux mixture, or when using it either for the destruction of charlock, for dressing wheat, or for the cure of foot-rot in sheep.

**Sale of Impure
Sulphate of Copper.**

In purchasing it care should be taken to demand a product of 98 per cent. purity, while the article offered as "agricultural" sulphate of copper should be scrupulously avoided. The usual adulterant is sulphate of iron, which is much cheaper. An easy test for the presence of iron in sulphate of copper is to dissolve a little in water and add ammonia, constantly stirring until a deep blue liquid is formed. Any quantity of brown flocks floating about in this blue liquid indicates the presence of so much iron that the sulphate of copper should be subjected to a proper analysis before use.

During the past year the Board have had evidence that impure sulphate of copper continues to be sold in considerable quantities. Early in 1908 the Crown Agents for the Colonies stated that certain wholesale chemists, in executing an order for sulphate of copper for the Agricultural Department of one of the Crown Colonies, sent sulphate of iron containing about 10 per cent. copper sulphate; and that in reply to the representations of the Crown Agents, they stated that this was the usual article supplied under the designation of sulphate of copper for agricultural purposes.

In consequence, 18 samples were purchased by Inspectors of the Board from chemists in different parts of the country. Of these 12 were commercially pure blue vitriol or sulphate of copper. In two cases the description sulphate of copper or blue vitriol was applied to articles containing 51.5 and 39.2 per cent. respectively of sulphate of iron. In these cases the Board directed inquiry to be made with a view to prosecutions under the Merchandise Marks Acts. One sample described as powdered vitriol contained 78.6 per cent. of sulphate of iron, and was coloured with Prussian blue. Another sample described as vitriolised wheat dressing contained 66 per cent. of sulphate of iron, and two other samples sold under a fancy name contained 76 per cent. and 56 per cent. respectively of sulphate of iron.

It is evident, therefore, that farmers should exercise considerable caution in purchasing sulphate of copper.

The President of the Board of Agriculture and Fisheries appointed a Committee in April, 1905, to inquire, by means of experimental investigation and otherwise, into the pathology and etiology of Epizootic Abortion, and to consider whether any, and if so, what, preventive and remedial measures might with advantage be adopted with respect to that disease.

**Report of
Committee on
Epizootic Abortion.**

The Committee was composed of the following gentlemen:—Sir Edward Strachey, Bart., M.P.; the Very Rev. Dr. John Gillespie; Professor (now Sir) John McFadyean, M.R.C.V.S., M.B., B.Sc., Principal of the Royal Veterinary College; Mr. William Hunting, F.R.C.V.S.; Dr. George H. Falkiner Nuttall, F.R.S.; and Mr. Stewart Stockman, M.R.C.V.S., Chief Veterinary Officer of the Board of Agriculture and Fisheries. Professor John McFadyean acted as Chairman, and Mr. James Ralph Jackson, M.R.C.V.S., of the Board of Agriculture and Fisheries, as Secretary to the Committee.

The Committee have now submitted a Report [Cd. 4742, price 3d.] embodying the principal results of their investigations concerning epizootic abortion as it occurs among bovine animals, together with an Appendix, which gives a detailed account of the experiments and observations on which the Report is based.

Microbe of Cattle Abortion.—The Report describes in detail the microbe of cattle abortion, which after considerable investigation was found to be identical with the bacillus isolated by Dr. Bang in Denmark, in 1897, and the Committee consider that there is no reason to doubt that the Danish and English diseases are one and the same.

Virulent Material.—The microbe is chiefly found in the contents of the infected uterus, that is to say, the exudate, the foetal membranes, and the foetus. As long as the affected uterus remains closed these materials are inoperative so far as other animals are concerned, but once they have been expelled they become dangerous. The discharge which comes from the genital organs for a varying period after the

act is also virulent. It is possible that the dung of an animal which has ingested infective material may be virulent for a time. It is improbable that abortion bacilli are excreted in the milk of affected cows.

The length of time during which the virulent materials may remain infective outside the animal is of considerable importance, and it appeared from the experiments that virulent material may, if kept fluid and free from putrefaction, remain infective for seven months, but not for a year. Observations on this point are being continued.

Methods of Infection.—Once the contents of the uterus have been expelled the virulent material may be carried to other parts of the cowshed along the surface drains, and may be transported long distances in the soiled manure, on the coats of the aborting animals and their companions, on the hands and boots of attendants, and also by dogs and other animals. Cows which have aborted must also be considered sources of infection so long as the discharge continues to come from the genital organs, and it may continue intermittently for a few weeks if the animals be not treated. Such animals, if not isolated, may continue to infect the sheds, or the pastures when turned out to graze.

From these sources fresh animals may be infected, and there are two ways in which the virulent material may gain access to the pregnant uterus, viz., by the vagina and by the mouth. With regard to infection by the mouth, this is a natural method of infection which until recently did not enter into anybody's calculations regarding the spread of abortion, and as the food, including the pastures, and even the feeding trough, may more or less easily be contaminated on an infected establishment, it seems highly probable that infection by ingestion often takes place. In fact, the Committee are inclined to believe that the disease is more frequently contracted in this way than in any other.

Infection by the vagina has always been supposed to be the most frequent natural method, partly because it was thought that the gutter which in most cowsheds runs behind cows standing in line often brings the discharges from an aborting cow in contact with the tails and external genital organs of her companions. In considering the relative

importance of infection resulting from the more or less accidental admission of infective material from the floor or dirt of the cowshed, it must be borne in mind that, even when discharges from an infected cow do reach the floor or become mixed with the excreta in the channel behind the cows, the chances must usually be against the bacilli gaining entrance to the genital passages, and that the number of bacilli which could be so admitted to the vulva or vagina under ordinary conditions must generally be small. Infection by means of the bull, though it may occur, is regarded as probably rare.

Immunisation.—After discussing the symptoms and diagnosis of the disease, the Committee describe the attempts made to produce immunity by the inoculation of large doses of pure culture. The pure culture of the abortion bacillus when injected into non-pregnant animals seemed quite harmless, and the experimental results with heifers were encouraging. An endeavour will be made to induce owners of infected herds to try this method under the supervision of the Board, with a view to obtain an idea of its value as a practical measure in fighting epizootic abortion. It is also proposed in the same way to test the effect of subcutaneous injections of dead bacilli, and the results of both these experimental investigations will be dealt with in a later report.

METHODS OF PREVENTION AND ERADICATION.—The Committee then proceed to discuss the methods which have been relied upon in the past for the prevention of abortion and its eradication from a herd, and their conclusions are briefly as follows:—

Spraying of the External Genital Organs.—This is done on the assumption that virulent material may at intervals come in contact with the external genital organs. It is, however, highly improbable that infection can take place through the agency of virulent material which has been merely deposited on or about the external genital organs, in addition to which, to be effectual, any bactericidal agent would require to be applied to the material almost at the moment when it comes in contact with the genital organs—an impossible thing to accomplish by periodical spraying. This method, therefore, is useless so long as the animals

remain in an infected byre, and it may be discarded. Immediately before removing an animal from infected to clean premises, however, it would be advisable to wash the posterior portions of its body thoroughly with a disinfectant solution, such as corrosive sublimate, 1 in 2,000, or carbolic acid, 3 per cent.

Isolation of Animals as soon as they show Signs of Abortion.—The necessity for this measure is obvious, and its importance cannot be too much insisted on. Only a proportion of the affected animals, however, show premonitory symptoms, and quite a number may abort amongst their companions without warning. Measures of immediate isolation, therefore, lose much of their undoubted theoretical value, owing to the difficulty in the way of carrying them out in practice. It is hoped, however, that further investigations will furnish a method of diagnosing the disease a considerable time before the uterus has ejected its virulent contents, and so give to measures of isolation their full and undoubted value in practice.

Internal Administration of Carbolic Acid.—As a preventive agent by internal administration, carbolic acid is believed to be useless.

Irrigation of the Genital Passages after Abortion.—It is considered probable that disinfection of the uterus by antiseptics is not necessary to rid the organ of abortion bacilli, and the Committee are of opinion that it is futile to attempt it by irrigation methods. So long as a discharge continues to come from the genital passages, it is thought that for hygienic and therapeutic reasons they ought to be cleansed once or twice daily by the intra-vaginal injection of tepid antiseptic solutions, such as a 2 per cent. solution of carbolic acid or a 1 in 3,000 solution of corrosive sublimate, but not on the ground that the injections will disinfect the uterus. It will seldom be necessary to continue the injections for more than a month, and after three months there should be small risk in putting the cow to the bull, provided she is afterwards protected against fresh infection.

Removal and Disposal of Animals which have Aborted.—It is quite a prevalent custom to feed for the butcher cows which have aborted. It is also customary to sell such cows

alive in the open market. The latter custom is likely to introduce disease to other establishments, unless the animals have ceased to discharge; and they should be kept for at least three months after abortion before being sent for sale.

The first custom is less objectionable than the second, but a breeder will be more likely to get rid of abortion from his herds by keeping such animals than by disposing of them and bringing in new ones before his entire herd is free from the disease. There can be no doubt that in most cases an attack of the disease greatly increases an animal's resistance to future attacks, and that in a large proportion of the affected animals, probably in the majority, this resistance is sufficient to fortify them against infection during their next pregnancy. It is beyond doubt that a considerable proportion may abort twice in succession, but it is not improbable that inoculation methods may now be successfully employed to exalt their resistance. In the midst of infection there is no better guarantee against the disease than the possession of an immune stock, and for this reason on infected premises the animals which have already aborted are to be looked upon as valuable assets for purposes of eradication, much more valuable than the new and susceptible animals brought in. A small proportion of cows will not hold to the bull for an indefinite period after abortion, and it may be found better to fatten off such animals, unless they are of high value.

The Keeping of a Special Bull for Cows which have Aborted.—The Committee do not consider the bull a factor of the first importance in the dissemination of abortion, but infection by means of a contaminated bull must be looked upon as a distinct possibility. There is, therefore, something to be said in favour of keeping a bull for the service of cows which have aborted, and, when that is not possible, of disinfecting the external genital organs of the bull after he has served such cows. Of course, if the cows can be immunised the same bull might be used for all. Cows from a clean establishment should not be sent even to a clean bull on infected premises, and it is also inadvisable that cows from infected premises should be sent to a bull on a clean establishment.

Destruction of Virulent Material and Disinfection of Everything Contaminated by it.—The immediate disinfection of the virulent materials and contaminated objects is of great importance, more especially as it appears that the natural virus may remain active for a long time outside the body. The soiled litter, dung, exudate, membranes, and foetus should all be removed at once, preferably after they have been treated with caustic lime. After removal they should be soaked in paraffin and burned, or buried in a deep pit, preferably the former. On no account should the foetus and membranes be fed to pigs or dogs. When a foetus is aborted alive, as sometimes happens, it seldom survives long, and it is advisable to kill and destroy it, since it may excrete abundance of virulent material from its intestines if allowed to live. If, however, it be decided not to kill it, it should immediately be isolated. The walls of the stall and the floor should be washed or strewn thickly with caustic lime, or drenched freely with boiling water. The temperature necessary to kill the bacillus is not great, and this simple method of disinfection should prove efficacious. Lastly, the boots, clothing, and hands of attendants should be disinfected by making use of any reliable disinfectant, such as a 3 or 4 per cent. solution of carbolic acid.

Preventive Inoculation.—As regards the preventive inoculation referred to above, a considerable number of observations on the value of this method are now being conducted on infected herds in different parts of the country, but the value of the method cannot be estimated until a relatively large number of the inoculated animals exposed to natural infection either abort or give birth to calves at full term. Should the results under the conditions of actual practice bear out those already obtained in the laboratory, stockowners will be in possession of a preventive method which is perhaps the most valuable of all methods for dealing with a disease of the nature of epizootic abortion. Such a method would only be employed in herds in which infection already exists, and the best way to make use of it would be, assuming that the results in practice bear out those obtained at the laboratory, to inoculate all new animals coming in, and those already in the herd which have calved normally,

about two months before they are put to the bull. Since one cannot be certain that every animal which has aborted will have acquired immunity, it would be advisable also to inoculate the latter to exalt whatever degree of resistance they have acquired from the natural attack, but the animals which have aborted should not be put to the bull for a period of three months.

A further report will be made on certain other points at a later date.

In a memorandum on the subject of the Island of Hokkaido, Japan, Mr. E. F. Crowe, Commercial Attaché at Tokio, mentions that there are two important **British Live Stock and Machinery in Japan.** stock farms on the island, one belonging to the Prefecture, and one to the Department of Agriculture, in addition to two horse-breeding farms belonging to the Government. There are also some large private stock farms.

The farm belonging to the Prefecture possesses 247 cattle, mostly Ayrshire and Shorthorn; the amount of butter produced annually is about 7,000 lb., and the dairy machinery is of a London make. Most of the other machinery on the farm, however, is American.

There are altogether 429 horses, comprising thoroughbreds, trotters, Anglo-Arabs, and Clydesdales, and about 200 Southdown and Cotswold sheep. The Japanese, however, do not care for mutton, and the director of the farm is doubtful whether sheep can be kept successfully for the sake of the wool alone. As regards pigs, the stock consists of 80 Berkshires, and experiments are being made in ham-curing. Poultry are represented by Plymouth Rocks.

The farm belonging to the Department of Agriculture possesses 80 Simmenthal cattle, 40 Brown Swiss, and 50 Ayrshires, as well as 170 Southdown and Shropshire sheep.

Mr. Crowe suggests that there is an opening for British machinery here if it were brought more to the notice of the directors and owners of these and other farms on the island. (Names and addresses can be ascertained, on application at the Office of the Board, 8 Whitehall Place, S.W.)

In the Message of the President of the State of Minas Geraes, Brazil, dated 18 June, 1909, reference is made to the fact that the State Bureau of Agriculture keeps a stock of machinery and implements, both at Rio de Janeiro and at Sao Paulo, for sale to farmers.

**Opening for British
Live Stock and
Machinery in Brazil.**

During 1908, 1,743 agricultural implements were sold, as well as some for vine-growing, from which it may be gathered that the introduction of agricultural machinery is becoming more general. In the first four months of 1909, the Bureau imported 266 agricultural machines.

The importation of foreign breeding stock has considerably increased. In response to an appeal from many stock-raisers, the Government opened a list in June, 1908, and applications were received for 914 cattle, 99 goats, 34 sheep, 7 horses, 2 pigs, and 9 fowls. Tenders were invited, and a British firm in Rio de Janeiro undertook the selection, purchase, and transport of the stock on a commission of $7\frac{1}{2}$ per cent. of the amount of the whole purchase.

Many consignments have already arrived, the latest being one of 649 Zebus and other Indian cattle. In consequence of fresh applications, the Bureau of Agriculture has opened another list, which will close on 31st December next. Orders for 800 head of stock have already been received. The name and address of the firm who undertook the previous importation can be ascertained on application at the Office of the Board.

Information as regards demand for live stock, &c., in Brazil has appeared in previous numbers of this journal as follows: August, 1907, p. 303; March, 1908, p. 738; April, 1908, p. 50; January, 1909, p. 755; April, 1909, p. 37.

The British Bee-keepers' Association have made arrangements with a firm of underwriters at Lloyd's for insurance against liabilities for injuries caused by bees.

**British Bee-keepers'
Insurance Scheme.**

The policy indemnifies the owners of bee hives against their liability to third parties for damages to persons or property occasioned

by bees from the insured apiary outside such apiary, such claim in any one year not to exceed the sum of £30 in the aggregate, and not to include any claim for injury to the assured, or persons or live stock under his control. The policy covers the period from 25th March, 1909, to 25th March, 1910, only.

The premium is at the rate of one penny per hive on the maximum number of hives kept, with a minimum premium of 9d. Non-members of British Bee-keepers' Association, or its affiliated associations, are required to pay a registration fee of 6d. in addition.

In 1907, two prosecutions were undertaken by the Board of Agriculture and Fisheries against persons who were selling under the name of "cider" an article
Sale of Imitation Cider. devoid of apple juice, and in each case a fine of £5, with £20 costs, was imposed.

The attention of the Board was recently drawn to a somewhat similar case of an article described as "Champagne Cyder." The label on the bottle stated that "This beverage is made from the finest apples, and, like all good ciders, cannot be made perfectly clear without injuring the flavour." A sample was analysed at the Government Laboratory, and was found to be not genuine cider. It consisted substantially of a solution of cane sugar, acidified with tartaric acid, and flavoured with cider. It contained only 1·8 per cent. of proof spirit, whereas the minimum amount known to occur in genuine English cider is 4·7 per cent.

Representations have been made to the manufacturers, who have given an undertaking not to describe the article in question or any similar article either as "Cyder" or as "Champagne Cyder."

The grants awarded by the Board of Agriculture and Fisheries in aid of agricultural education in England and Wales amounted to £12,100 in the year ending March 31st, 1908, while, in addition, special grants amounting to £380 were made for experiment and research.

Agricultural Education in England and Wales.

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The distribution of these grants and the general subject

of Agricultural Education are dealt with in a report [Cd. 4802. Price 10d.] made to the Board by the Assistant Secretary in charge of this work (Mr. T. H. Middleton), while in the appendices to the report detailed information is given as to the institutions to which grants are made, as well as particulars of the agricultural instruction provided by County Councils in England and Wales. The whole volume thus forms a useful handbook of information for students preparing to study agriculture. It may be obtained from Messrs. Wyman and Sons, Fetter Lane, E.C., price 10d. (including postage, 1s. 0½d.).

Mr. Middleton refers to the fact that although there were 1,313 students attending the institutions aided by the Board, this number probably represented only a small proportion of the total number of young men about to engage in an agricultural career, and for whom some form of agricultural instruction is desirable. The relatively small number availing themselves of the facilities offered may be regarded as proof that the ordinary farmer is not as yet convinced of what may be termed the commercial value of agricultural education. He knows that if his son is to succeed in business in a town he must have a good school education, and he is prepared to supply that education; but he is not persuaded that education is equally necessary for the successful farmer. All experience, however, proves that agricultural education, when carefully adapted to the condition of a locality, is of value, and the question is how to convince the ordinary farmer of its importance. Mr. Middleton suggests as one step in this direction that more attention must be given to the subject-matter of the instruction provided. The ordinary farmer does not ask for an exposition of general principles, but for instruction in principles which apply to certain local conditions. General principles are in their proper place when they form the subject-matter of a three or four years' university course, and when they are studied by pupils who have had a good general education; but the average farmer's son cannot give more than from 20 to 40 weeks to the theoretical study of agriculture, and unless the subjects of study are "localised" and carefully adapted to his needs, the result cannot be satisfactory. It is instruction in the application of science to local agriculture rather than general principles that

the farmer specially asks for, and in order that he may have this, it is essential that the teaching institutions should command the services of trained and competent men who can apply scientific methods to the study of local conditions.

The question of the supply of qualified teachers is, however, a problem of great difficulty, owing to the fact that the present prospects of the agricultural teacher are not, on the average, sufficiently attractive to induce men of the right type to take up the subject. If it is admitted, however, that the success of agricultural education in this country depends above everything else on the quality of the instruction provided, Mr. Middleton remarks that it should not be impossible to obtain the funds that would command for agriculture the services of a proportion of the most promising students who pass through the universities. Unlike Law, Medicine, or Engineering, Agriculture offers no great prizes to successful men, but the subject has attractions which would secure for it an ample supply of talent if means were found of providing fair salaries at the institutions established for teaching and research.

As an aid to securing suitable teachers and investigators a scholarship system should be established which would enable promising students who had taken a good degree to continue their residence at a university or other suitable institution as research scholars for a period of from two to three years. If as many as five scholarships per annum were offered, worth £150 in the first year and rising to £175 and £200 when renewed for a second and third year, there would always be available a number of young men with a good knowledge of the facts and methods of agricultural science from amongst whom institutions would be able to secure assistants of the best type. At the same time the work of such scholars would be likely to prove of considerable value in advancing agricultural science, so that the country would get a direct return from the money devoted to the scholarship scheme.

The question of the amount of public money available for purposes of agricultural education is discussed in the report, and it is shown that from various causes the expenditure of the local education authorities has declined of late, as compared with some earlier years, while the provision made in

different counties is irregular and unsystematic, one of the least satisfactory features of agricultural education in England at the present time being that no sufficient means exist, either of helping counties which are poor financially or of stimulating backward local authorities.

The report concludes with a consideration of the grounds on which State aid may fairly be claimed for agricultural education. It is pointed out that the direct effect of any improvement in English agriculture would be a cheapening in the cost of production, and although in some cases the benefit would be taken by the agricultural classes, in others it would be handed on to the consumer. Mr. Middleton therefore urges the provision of the means necessary to obtain for agriculture a larger share of attention from scientific men in the expectation that the resources of the country will be developed to the benefit of all classes of the community.

SUMMARY OF AGRICULTURAL EXPERIMENTS.

MISCELLANEOUS EXPERIMENTS.*

Wheat after "Seeds" (Univ. of Leeds. Bull. No. 74).—This experiment was intended to compare the crop after a clover mixture and after a clover and rye-grass mixture. It was found difficult, however, to arrange the experiment under precisely similar conditions, and the difference in the yields obtained was insignificant.

Wheat after Roots (Lancs. C.C., Agric. Dept. Bull. No. 11).—Where wheat is grown in rotation after roots, it is not usual for any assistance in the form of artificial manures to be given, and this experiment was arranged in 1906 at four centres to test the effect of such manuring. The results showed that artificial manures can be economically employed to manure wheat following a root crop, but that it is not necessary to employ a "complete" mixture to obtain a good yield, though a "complete" mixture, according to the average figures of the experiment, gave slightly the largest crop and the highest estimated profit. A mixture of artificial manures containing only phosphates and potash, however, should not be used unless it is intended to supplement the mixture later by a further top dressing of a nitrogenous manure.

In this experiment none of the dressings of artificial manures em-

* The summaries of Agricultural Experiments which have appeared in the present volume have been as follows:—Experiments with Cereals, April, p. 65, and May, p. 150; Experiments with Root Crops, June, p. 239, and July, p. 311; Experiments with Potatoes, July, p. 313, and August, p. 402; Miscellaneous Manurial Experiments, August, p. 405.

The present issue contains some additional experiments, the reports of which were in several cases received too late to be included in the earlier summaries.

played produced a growth sufficiently rank in the wheat to affect the "seeds" detrimentally. It appeared that the phosphatic and potassic manures beneficially affected the clovers, and the nitrate of soda encouraged the growth of the grasses.

On medium soils where wheat follows a root crop which has received only a moderate application of farmyard manure, the following dressing is recommended:—Nitrate of soda, 1 cwt.; superphosphate, 2 cwt.; muriate of potash, $\frac{1}{2}$ cwt.—costing about 21s. 9d.

On medium soils where the root crop has been well manured, it may be inadvisable to use artificial manures on the wheat. If, however, the plant in spring is backward and lacks colour, and the soil has plenty of "body," and is not too black, a dressing of $\frac{1}{4}$ to 1 cwt. nitrate of soda, costing about 11s. 6d., may be given per acre.

In the case of (a) soils in "good heart," and (b) rich black land, no general recommendations are made. In moist seasons on such soils the corn following roots is extremely liable to "lodge" or "go down," and applications of active nitrogenous manures like nitrate of soda will simply enhance that tendency. Each case must, therefore, be considered and treated on its own particular merits.

Manuring of Rye (Lancs. C.C., Agric. Dept. Bull. No. 12).—An experiment on this subject was conducted at two centres on similar lines to the experiment referred to above, and the conclusions arrived at were very similar.

The dressing recommended for rye is nitrate of soda 1 cwt., and superphosphate 2 cwt., costing about 17s. The inclusion of kainit is not recommended, inasmuch as the increase due to this manure was found in the experiment to be only just sufficient to meet its initial cost. Each farmer, therefore, must satisfy himself on his own land as to the desirability, or otherwise, of using kainit in addition to nitrate of soda and superphosphate on the rye crop.

Experiments with Oats and Barley (Aberdeen Coll. of Agric. Bull. No. 11)—The experiments recorded in this bulletin form part of a series which have been in progress for several years, but the weather of 1907 was so unfavourable that the results cannot be regarded as giving more than a general indication of the comparative merits of the different varieties.

The average yield of dressed grain in bushels of 42 lb. was as follows:—Thousand Dollar, 72 $\frac{1}{2}$; Banner, 69; Abundance, 66; Potato, 61 $\frac{1}{2}$; and Universal, 56 $\frac{1}{2}$. Thousand Dollar on the whole showed a smaller proportion of light grain, while Banner and Potato gave the most.

A test was made to compare the effect of using small as compared with large oat seed, and it was found that the small seed produced considerably more grain, both heavy and light, than the large seed, but 3 cwt. less straw.

The milling properties of oats received a good deal of attention, and it is stated that the grounds for believing in the exceptional superiority of Potato oats for this purpose are few, and that there is much evidence to show that several of the new varieties are quite as productive of meal per quarter and far more productive of meal per acre. "

The results of a variety test of barley at one centre are also given. Danish Archer gave the best result with 43 bushels.

Varieties of Oats (Univ. Coll. of North Wales, Bangor. Bull 5. 1908).—This bulletin gives the result obtained from twenty-one varieties of oats, grown at one centre. Stable King (87 bus.) gave the best result in the white oats, and Rival (73 bus.) in the black oats.

Varieties of Oats, Barley, Wheat, and Beans (Northumberland C.C., Guide to Expts. at Cockle Park for 1909).—The results obtained in 1908 are given in continuation of the results of trials in previous years.

Manuring of Mangolds (Somerset C.C., Rept. on Field Trials of Manures, 1904-8).—Experiments on a systematic plan have been carried out for five years on thirty-five farms in Somerset. Ten plots were arranged at each centre, two plots being unmanured and the remainder receiving various artificials. All the plots received a dressing of from twenty to twenty-five loads of dung per acre, so that the point investigated was the advantage of applying artificial manures to land that had already received farmyard manure.

The plots which did not receive any artificials gave an average yield of 28 tons 7 cwt., and the addition of 2 cwt. nitrate of soda produced $4\frac{1}{2}$ tons increase at a cost of 22s. 6d., leaving an estimated profit per acre of 15s. 6d.; 6 cwt. of superphosphate only just paid for itself, but 3 cwt. of kainit produced 3 tons 3 cwt. increase, and 3 cwt. common salt produced 4 tons 6 cwt. increase, which were equivalent to a profit of 17s. and 29s. 6d. respectively, after deducting cost.

The largest increase (7 tons 13 cwt.) was obtained from 2 cwt. nitrate of soda, 3 cwt. superphosphate, and 3 cwt. salt, and gave a profit of 26s. 3d., while 2 cwt. nitrate and 3 cwt. salt gave an increased yield of 6 tons 9 cwt., and a profit of 24s. per acre. The mangolds, however, on the plot receiving superphosphate were of better quality. It is considered that the use of artificials, especially nitrate and superphosphate, with either kainit or salt, assists in giving the crop a start, particularly in an unfavourable season; and since it is a matter of the greatest importance to secure a regular plant, the use of artificial dressings in some form or another is recommended.

Experiments with Mangolds and Cabbage (Northumberland C.C., Guide to Expts. at Cockle Park, 1909).—Trials of two varieties of mangolds have been made during the past four years. The average yield of Mammoth Long Red has been 21 tons 19 cwt., and of prizewinner Yellow Globe 20 tons 19½ cwt., with 12.05 per cent. and 10.32 per cent. of dry matter respectively.

Experiments in the manuring of mangolds have, in addition, been in progress since 1903. In the five years 1903-7, the best result on the average was obtained from 12 tons dung and a dressing of 510 lb. nitrate of soda, 336 lb. superphosphate, and 300 lb. muriate of potash, though the use of the same dressing with 2 cwt. of common salt instead of the dung gave nearly as good results.

A comparison of the results given by the different plots during the five years shows (a) that nitrate of soda gives better results than sulphate of ammonia, (b) that slag is better than superphosphate, (c) that sulphate of potash is better than muriate of potash, and (d) that common salt greatly increases the crop. In view of these results, the

manuring of the plots has been rearranged, and the figures for 1908 are given in the above publication.

During the three years 1906-8 four drills of cabbage were grown in the centre of the mangold plots, and received the same dressings throughout as the different plots of mangolds.

These trials appear to show that 10 to 12 tons dung, 1 cwt. sulphate of ammonia, 4 cwt. slag, and 1 cwt. muriate of potash, all applied in the drills, with the addition of $1\frac{1}{2}$ cwt. nitrate of soda applied in two top dressings, would make a good dressing per acre for cabbages. On the heavier classes of soils muriate of potash might be omitted. Common salt (2 cwt. per acre) increased the crop in 1908, but not in the two previous years.

Varieties of Swedes and Turnips (Northumberland C.C., Guide to Expts. at Cockle Park, 1909).—The average yield and composition of four different varieties of swedes in the six years 1903-8 are given, as well as the results from a number of varieties in 1908, and the average percentage of dry matter found in five varieties during the past nine years.

Potato Trials (Harper-Adams Agric. College, Field Expts., 1908).—Experiments on a number of different points were carried out in 1908. The following is a summary of the conclusions arrived at:—(1) That immature home-grown seed is superior to mature home-grown; (2) that it pays to box seed potatoes; (3) that Scotch seed obtained from Dumfriesshire is superior to all other classes of seed; (4) that sulphate of ammonia is a better form in which to apply nitrogen than nitrate of soda; (5) that varying quantities of potash manures do not affect the quality of a crop as much as a nitrogenous manure applied alone; (6) that when muriate of potash is used, nitrate of soda is preferable to sulphate of ammonia, the tubers being better in quality; and (7) that the best varieties of 1908 were Midlothian Early, Colleen, Factor, and Conquering Hero.

The results of potato trials conducted in Staffordshire are also given.

Potato Trials (Midland Agric. College, Report on Expts., 1907-8, and Bull. 3, 1908-9)—In 1907 a comparison of Scotch, Irish, and home-grown seed gave results much in favour of Irish seed. The trials were repeated in 1908, when the yields of the Scotch and Irish seed were practically the same, both exceeding the yield of the English seed.

Experiments in manuring have been carried on for several years, and the conclusions arrived at are given in the Report for 1907-8. The most profitable mixture for use with 10-15 tons of dung is considered to be $1\frac{1}{2}$ cwt. sulphate of ammonia, 4 cwt. superphosphate, and 1 or $1\frac{1}{2}$ cwt. sulphate of potash.

Potato Trials (Univ. Coll. of N. Wales, Bangor, Agric. Dept. Bull. 9, 1908).—An experiment was carried out with potato seed obtained from ten different districts with a view to test the effect of locality on the yield. This experiment is being continued.

Seed of different sizes was also compared with cut seed. In 1907 large seed produced over a ton of marketable potatoes more than either of the other plots, an increase just sufficient to compensate for the extra quantity of seed required in planting, but in 1908 the large seed produced the smallest quantity of marketable potatoes. The cut seed

gave rather better results in 1907 than the small seed, and in 1908 than either of the other plots.

The effect of planting potatoes at different distances apart in the rows was tested both in 1907 and 1908.

Manuring of Potatoes (Somerset C.C., Rept. on Field Trials of Manures, 1904-8).—An experiment has been carried out on 20 farms in Somerset during five seasons to test the effect of artificial manures on the potato crop. Eight plots were arranged at each centre. The average yield from the unmanured plot was 6 tons, and the application of 2 cwt. of sulphate of ammonia and 4 cwt. of superphosphate (Plot 8) gave the best result (7 tons 18 cwt.). It was also the most profitable after deducting the cost of the manure. The addition of 1 cwt. muriate of potash to this mixture produced no effect, the yield being practically the same. Sulphate of ammonia and muriate of potash also gave a good yield (7 tons 12 cwt.), but the cost of the manures made it less profitable.

It would seem from this experiment that the most important substances for the potato crop on the greater number of soils in Somerset are nitrogen and phosphates, though on soils known to be deficient in potash 1 cwt. of muriate or sulphate of potash or 4 cwt. of kainit should be used as well.

Potato Trials (University College Reading, Expts. at the College Farm, 1908).—Seed from English, Scotch, and Irish sources was planted, some having been two and others three years on the farm. The results showed that the cropping power of potatoes diminishes rapidly in the third season.

Potato Trials (Northumberland C.C., Guide to Expts. at Cockle Park for 1909).—The results of the trials of varieties of potatoes, and of spring and winter planting in 1906-1908, are given.

Maize Trials (University College, Reading, Results of Expts. at the College Farm, 1908).—An acre of maize was grown, but the yield (19 tons 6 cwt.) green was less than in 1907 (24 tons 11 cwt.), but the feeding quality was probably better.

Varieties of Lucerne (Journal of the Royal Agric. Society, Vol. 69, 1908). The three different kinds of lucerne—Provence, American, and Canadian—sown in 1905, were kept down in 1908, and gave three cuttings. The total green produce per acre for 1908 was as follows: Provence seed, 6 tons 13 cwt.; American seed, 6 tons 4 cwt.; Canadian seed, 9 tons 3 cwt.

The Canadian variety has now, for the third year in succession, given considerably the highest yield; the Provence variety, as in 1907, was somewhat better than the American, though this was not the case in 1906.

Three Argentine varieties were sown in 1908, but were attacked by a fungus at the end of September and had to be cut down very close to the ground to prevent the disease spreading. The yield varied from 9 to 13 tons.

Manuring of Black Fenland (Cambridge Univ., Dept. of Agric. Bull. No. 6).—Although the analysis of fen soils does not suggest a deficiency of phosphates, yet in practice it is found that applications of phosphatic manures always increase the yield of crops, and that superphosphate gives the best economic result.

This proved to be the case at three centres with mangolds, and also at two centres with potatoes. For the potato crop on black, peaty soils a dressing of 8 to 10 cwt. of superphosphate per acre is likely to give the greatest profit, while on silty soils from 4 to 6 cwt. of superphosphate, with $\frac{1}{2}$ cwt. sulphate or muriate of potash in addition, will probably give better results.

Experiments with barley, beans, and hemp on these black soils have also proved superphosphate in large dressings to be the most profitable manure.

Rotation Experiments (Northumberland C.C., Guide to Expts. at Cockle Park, 1909). This publication gives the results of the third series (1905-1908) of rotation experiments which have been carried out since 1897. The rotation is turnips or swedes, oats or barley, hay, and oats. Twenty-one different systems of manuring have been tested. The average value of the yield of the unmanured plot was £16 19s. 6d. in the first rotation, £15 4s. in the second, and £13 5s. 10d. in the third, while the average value of the four crops on the manured plots was £26 1s. 3d., £27 15s., and £29 15s. respectively in the three rotations.

The report itself should be consulted to ascertain the effect of the manuring on the different crops, but it may be said that the plot which has given the highest increase over the unmanured plot, after deducting the cost of the manure, received 10 tons of dung for the root crop and 7 cwt. of a complete dressing of artificial manures for the hay crop. This plot (No. 17) has given a gain over the unmanured plot in the 12 years of £35 os. 8d. The next highest (No. 15) has given £33 9s. 8d. for the application of 10 tons of dung alone. Ten tons of dung and 7 cwt. of complete artificials applied to the root crop on Plot 16 gave a smaller nett yield (£31 3s. 10d.), while the result was practically the same (£31 16s. 9d.) on Plot 18, where 10 tons of dung and $3\frac{1}{2}$ cwt. of artificials were applied to roots and $3\frac{1}{2}$ cwt. artificials to the hay crop. This was also the case on Plot 19 (£31 18s. 3d.), where 10 tons of dung were given to the hay crop in addition to the dressing for Plot 18.

The best results, therefore, have been obtained by applying dung only to the swedes and complete artificials to the hay. The standard dressing of artificial manure consisted of 1 cwt. sulphate of ammonia, 5 cwt. superphosphate, and 1 cwt. muriate of potash.

Calcium Cyanamide (Northumberland C.C., Guide to Expts. at Cockle Park, 1909).—Trials were made in 1907 and 1908 with calcium cyanamide on oats, which showed it to be a useful nitrogenous manure. Further trials with oats and mangolds are in progress.

New Nitrogenous Manures (West of Scotland Agric. College, Bull. No. 40).—This Bulletin describes the experiments with new nitrogenous manures conducted by Prof. R. A. Berry at the College Expt. Station on oats, hay, mangolds, potatoes, and sugar beet.

Inoculation Experiments (Harper-Adams Agric. College, Field Experiments, 1908).—A series of trials of "Nitro-Bacterine" were carried out, along with another preparation sent by Dr. Hutchinson, of Rothamsted. The results obtained both from the open ground and box trials are stated to indicate that on a barren soil the use of the cultures may be attended with some degree of success, but that on

ordinary soil, even if it is not in a high state of cultivation, there is little benefit to be derived from the use of either preparation.

Inoculation Experiments (University College, Reading, Results of Expts. at the College Farm, 1908).—Beans were inoculated with a pure culture of nodule organisms and with "Nitro-Bacterine." The yields were as follows:—Not inoculated, 303½ lb.; inoculated with pure culture, 284 lb.; inoculated with "Nitro-Bacterine," 345 lb.

Inoculation Experiments (Journal of the Royal Agricultural Society, Vol. 69, 1908).—An experiment was carried out with the inoculating material known as "Nitro-Bacterine," applied to white clover and lucerne. The white clover was of two varieties, ordinary Dutch white and a new variety, "Mammoth White." The lucerne seed was obtained direct from Argentina. Twelve plots were sown, each divided into halves, one-half being sown with inoculated seed, and the other half with seed not inoculated. In no instance was there any gain by inoculation of the seed in the case of the lucerne, but with white clover there was a small increase in each case. This experiment will be continued in 1909.

Inoculation Experiments (Rothamsted Experimental Station, Annual Supplement, 1908).—Figures are given of the produce of red clover hay in 1907 on soil inoculated with Hiltner's and Moore's preparations, and also with the soil of a field which had carried red clover in 1904. All three methods gave a better result than the uninoculated plots.

Inoculation Experiments (Journal of the Royal Horticultural Society, Vol. XXXIV., Part II.).—An exhaustive account is given of experiments which were conducted at the Royal Horticultural Society's Gardens at Wisley by Mr. F. J. Chittenden, Director of the Research Station and Laboratory, with the inoculating material known as "Nitro-Bacterine." It is prefaced by a note giving the history of the researches into the fixation of nitrogen by bacteria in the nodules of leguminous plants. (Information on the subject will be found in this *Journal*, September, 1904, p. 348; February, 1905, p. 669; March, 1905, p. 725; August, 1905, p. 282; February, 1906, p. 641; March, 1906, p. 759.)

Mr. Chittenden gives the following summary of the investigation:—

The soil of the Wisley Garden is one more likely to respond to such inoculation than the majority of garden soils, and it has been shown that the Wisley soil is lacking in none of the chemical elements necessary for the successful growth and development of the nodule-forming bacteria.

The experimental area was divided into twenty-four equal plots, twelve being on well-worked soil, and twelve on soil that had been fallowed in 1907. One of each pair of plots had seed which had been inoculated sown upon it, the other seed which had not been inoculated. One row of each of four varieties of peas was sown upon each plot, the same varieties being used throughout.

Seven out of the twelve plots on which inoculated seed was sown gave smaller crops than the corresponding uninoculated plots, and one gave an equal crop. In none of the cases was there any consistent increase in the crop due to inoculation.

The total weight of the crop from the whole of the plots receiving inoculated seed was 450 lb., while the total from the plots in which

uninoculated seed was sown was 515 lb. The uninoculated seed, therefore, gave a crop 14 per cent. heavier than the inoculated in the aggregate. The crop from the inoculated seed was not better in any way than that from the uninoculated, nor did it reach maturity earlier.

Mr. Chittenden concludes from these investigations that the inoculation of leguminous crops with "Nitro-Bacterine" in ordinary garden soil is not likely to prove beneficial.

Pot-culture Experiments (*Royal Agricultural Society Journal*, Vol. 69, 1908).—A summary is given of the experiments in progress at the Pot-culture Station at Woburn. These include an investigation into the influence, both on germination and crop return, of very minute quantities of salts of some of the rarer bodies, such as lithium and manganese; an inquiry into the prevention of acidity in soils; and the relation of magnesia to lime in soils, and the consequent effect on crops. Another set of experiments has reference to the advantage or otherwise of giving nitrogenous manures to fen soils; inoculation experiments are also being conducted, and also some in regard to the eradication of the wild onion.

Miscellaneous Experiments at Rothamsted (*Rothamsted Expt. Station Annual Report for 1908*).—This publication gives a brief account of the experiments carried out in 1908, with tables in continuation of the Guide to the Experimental Plots for 1906.

FOREIGN AND COLONIAL EXPERIMENTS.

The Cost of Spraying Apple Trees and the Results obtained (*Nebraska Agric. Expt. Sta., Bull. 106*).—This Bulletin deals with the question whether from the point of view of the practical fruit grower it pays to spray apple trees for apple scab and codlin moth; that is, whether the increase in the yield and the improvement in quality pay for the trouble and expense of spraying. It was felt that the proper way to determine the question was to spray in various orchards in many districts over a series of years, so as to obtain results both when the crop was heavy and light, and also when prices were high and low. Trials have so far been made in two years, and spraying has given profitable results in all the orchards in which it was tried.

Two orchards were dealt with in 1907, a portion in each being left unsprayed for comparison. Several sprayings were made, Bordeaux mixture and Paris green being used at the beginning and arsenate of lead at the end. The cost of the material used and of the labour worked out to less than 1d. per gallon in each orchard, but in one 22½ gallons per tree were used in the course of five sprayings, and in the other 15 gallons per tree were applied in four sprayings. The cost per tree in one was 1s. 8d. and in the other 1s. 2½d.

In one orchard 71 sprayed trees yielded 251 bushels worth £42, or 11s. 10d. per tree, while 30 unsprayed trees produced 53½ bushels valued at £4 12s., or 3s. 1d. per tree. In the other orchard 20 sprayed trees yielded 80½ bushels worth £16 3s., or 16s. 2d. per tree, while 10 unsprayed trees yielded 19 bushels worth £2 2s. 4d., or 4s. 3d. per tree.

Spraying not only increased the yield of fruit, but improved the quality. Thus, in one orchard, fruit of No. 1 grade constituted 44.9 per cent., and in the other 61.8 per cent. of the entire crop, on the

sprayed trees, while the unsprayed trees only gave 4 and 22.4 per cent. respectively of the best quality fruit.

The net gain per tree, after deducting the cost of spraying, was 7s. 1d. in one orchard and 10s. 8d. in the other, which is equal to a difference of £20 per acre.

Milking-Machine Experiments (Nebraska Agric. Expt. Sta., Bull. No. 108).—Experiments with the Burrell-Lawrence-Kennedy machine have been carried out at this station with 53 cows, extending in 20 cases over the entire lactation period, and the experiments are being continued with 10 heifers which have never been milked by hand.

The conclusions arrived at are summarised below.

Heifers in their first lactation apparently give better results by machine-milking than do aged cows that have been accustomed to hand-milking for one or more years, while some cows are not adapted to machine-milking.

One man working one machine can milk about the same number of cows per hour as one man milking by hand, but two men working four machines can practically do the work of three men milking by hand. One man with two machines can milk between ten and eleven cows per hour, and two operators with four machines about twenty-one cows per hour.

It was found necessary thoroughly to wash and boil the milking-machine parts after use, in order to produce clean milk, washing the machines at irregular intervals or simply drawing water through them being of no use.

The milking-machine is considered to be better fitted for large herds than small ones.

Information as to the working of the machines was collected from 13 farmers who have installed them, and the replies show varying degrees of success. Great importance is attached to the need for intelligent working.

MISCELLANEOUS NOTES.

Agriculture in Denmark.—The Report for 1908 on the Trade of Denmark (*F. O. Reports, Annual Series, No. 4,277*) states that, in the

Notes from Foreign and Colonial Office Reports.

case of the majority of the chief items of agricultural produce exported, prices fell, but the amount exported more than covered the deficit caused by the fall. The total value of the agricultural exports is put at £22,400,000, as against £20,800,000 in 1907. The rapid advance in these exports must in a great measure be attributed to the steady growth of co-operation as applied to butter, bacon, and eggs, the exports of these three commodities alone accounting for £17,394,000. Some brief particulars of the spread of co-operation are given.

The first co-operative dairy was established in West Jutland in 1882, and in 1906 there were 1,068 dairies with a membership of 157,500.

An instance of the successful working of co-operation in dairying on a large scale is afforded by the Trifolium dairy near Haslev, which now receives milk from 15,000 cows (in 1907, 14,000 cows). Its yearly production of butter amounts to 30,000 cwts., and of cheese 30,000 cwts.,

besides a large sale of milk in Copenhagen and Aarhus. The Danish Dairy Association, which has now been in existence about four years, is a union of 102 contributing dairies.

As regards bacon-curing, the first co-operative slaughter-house was founded in 1887 in Jutland, and in 1908 there were 33 slaughter-houses with 101,456 members. During 1908 these co-operative slaughter-houses accounted for 1,549,550 pigs, against 1,311,241 pigs in 1907, besides 16,004 cattle and 14,344 calves, while other slaughter-houses killed about 500,000 pigs, bringing the total number of pigs slaughtered in Denmark during 1908 to over 2,000,000.

The attempts to put the export of eggs on a rational basis began in the middle of 1890, and in 1906 there were 790 societies with a membership numbering 57,000. The Danish Farmers' Co-operative Egg Export Association has the same number of egg-collecting centres as in 1907—namely, 500, with a membership of 40,000. The value of the turnover in 1908 amounted to about £250,000. The price members have received for eggs has been 5½d. per lb. During 1908 there has been a considerable demand from the United Kingdom for sittings.

Sheep Breeding in the Falkland Islands.—The Annual Report, issued by the Colonial Office, on the Falkland Islands (No. 599) gives an account of the sheep breeding, which forms the principal industry of the Islands.

It is stated that the number of sheep in the Falklands in 1847 was estimated to be 200. In 1860 the number had been increased to about 10,000, but it was not until some years later that sheep-farming engaged serious attention.

The year 1867 has been given as the date when the first strenuous efforts were made to establish the industry on a permanent footing. The hardy settlers of the West Falklands were the pioneers. It was an up-hill task, but patience and perseverance won the day. The sheep for stocking runs were imported from the River Plate, but the climate of their new home proved at first to be so uncongenial that in some cases 30 to 50 per cent. perished. The difficulties in the way of transporting the wool to Stanley, to be placed on the market, were many, and the expense was great. The farmers, nevertheless, maintained their courage, and the industry grew each year in importance. Whereas the number of sheep in the Colony in 1867 was 35,000, ten years later it was 283,000. In the following decade the number rose to 563,000, and reached in 1896 the record total of 801,000. The average for the ten years ending 1908 was 720,000.

Greater attention than formerly is now being paid to the selection and culling of ewes, and the periodical improvement of flocks by the importation of pure blood. The manner in which sheep have become adapted to the forbidding climate of the Falklands is illustrated by the fact that the lambing season of 1908 resulted in an average of 77 per cent. Twenty-four Romney Marsh rams were imported during the past year from New Zealand, and nine from England.

The Report states that, owing to legislation protecting the Colony against the introduction of disease, and also making dipping compulsory, the pastoral industry is probably in a more flourishing state than at any previous period.

Agriculture in Russia.—The Report on the trade of the Consular

District of Odessa for 1908 (*F.O. Reports, Annual Series, No. 4295*) contains a large amount of information as to various agricultural matters, among which may be mentioned the following:—The harvest of 1908; exports of cereals; sale of agricultural machinery; cultivation of grass for seed; trial of machinery at an experimental farm; peasants' credit associations; the grain export trade of Nicolaieff and the credit system; cattle and sheep in the Don Territory; and the fruit crop of the Crimea.

The Report on the Consular District of Moscow (*F.O. Reports, Annual Series, No. 4323*), states that a noticeable feature of the year was the large number of dairy farms started in districts which hitherto had been purely grain or flax growing ones. The amount of land under grass increased in some places by 50 per cent., and this increase was almost entirely at the expense of flax fields.

Where grain growing was the sole employment in many of the northern provinces, formerly the exodus of the male population in search of work was often up to 88 per cent. of the whole. With the introduction of dairy farming, the movement fell in 1907 to 20 per cent., and in 1908 to 15 per cent.

Another hopeful symptom was the wider use of improved agricultural machinery and the increased use of artificial manures, &c. The transactions of the depôts of agricultural machinery in the south, south-eastern and Siberian districts show an increase of from 35 to 40 per cent. in the year, mainly for reapers and sowers, in spite of the dearth of iron. A considerably increased demand for artificial manures was also noticeable, mainly on the part of peasant proprietors.

Another very prominent feature was the decided tendency towards co-operative organisation. This tendency was very marked in the grain growing, dairy farming, cattle breeding, and similar industries, and was entirely spontaneous.

The activity of the zemstvos (county councils) during the year was mainly directed to raising the technique of agriculture in its various branches, and much was done in the collective buying of seed for sowing, furnishing villages with modern improved agricultural machinery, sending instructors into agricultural districts, improving cattle breeding, &c. Many societies for the collective purchase of grain, and of agricultural machinery, &c., were formed.

Small Holdings in Poland.—Large areas of land were bought by peasants in Poland during 1908, and a considerable number of estates were turned into small holdings. Not only has land become from 30 to 35 per cent. dearer in Poland, but there is a great increase in the "parcellation" of large estates, *i.e.*, breaking them up into small lots which are sold to the peasantry. Large land owners are much more ready to sell their land in this way than they were a few years ago. In their transactions with the peasant buyers they are considerably aided by the Peasants' Bank, by which the peasants are enabled to buy land without paying for it at the time. These processes are bringing about great changes in Poland. Peasant colonies are rapidly increasing, whereas the Polish farmer, owning from 400 to 900 acres, is disappearing by degrees. Unfortunately no statistics of the sale of land to peasants are to hand; but some idea may be gained of the way in which it has changed hands from

the fact that the peasants have acquired upwards of 14,800,000 acres since 1873, which means 48·8 per cent. of the total area of the Kingdom of Poland. Of this about 2,500,000 acres were purchased by the Peasants' Bank, which charges 6½ per cent. interest. In many cases, however, peasants now prefer to deal direct with the land owners. (*F. O. Reports, Annual Series, No. 4,232.*)

Forestry in the New England States.—The Report on the Trade of the Consular District of Boston (*F. O. Reports, Annual Series, No. 4,266*) contains information as to the recent steps for the conservation of forests in Massachusetts, New Hampshire, Vermont, and Maine. A considerable proportion of these States is under forest, and some efforts are now being made to encourage planting, &c.

The same subject is dealt with in the Report on Philadelphia (No. 4,255), where it is stated that during the last 10 years the study of forestry has advanced in the United States, and the number of technically trained foresters has increased from about 10 or 11 to over 400. Ten years ago there was not a single forestry school in the country, whereas now there are several which rank with those in Germany, and also about 20 of a more elementary type. Forest lands under the management of State Governments have grown very greatly, and the national forests under the Federal Government have increased from 39,000,000 acres, which formerly were practically unused and unprotected, to 165,000,000 acres, now used, guarded and improved both in productiveness and accessibility.

The Pennsylvania Department of Forestry has during the past year directed most of its attention and energy to acquiring new land, the establishment of good nurseries and the promotion of re-afforestation work. The State now holds as forest reserve land about 10 per cent. of the forest area of the whole Commonwealth. The nursery area has been increased to over 12 acres, and in another year the number of seedlings will be more than doubled. There are at present in three nurseries a total number of 2,250,000 seedlings, of which about 8 per cent. are hard woods, the remainder being conifers, mostly white pine. The reserves are being improved, and roads are being built in order to make the land accessible. Special attention is paid to the control of forest fires, and losses have been very greatly decreased thereby.

Cattle Raising in Brazil.—The Report on the Trade of Porto Alegre (*F. O. Reports, Annual Series, No. 4,248*) states that cattle raising and the products derived from it undoubtedly form the principal industry of the State of Rio Grande do Sul, but so far, with few exceptions, there has been little or no attempt to carry it on in a scientific and progressive manner. A few cattle breeders are beginning to introduce pedigree animals into their herds, chiefly from Uruguay and Argentina, but this is far from being common, and, generally speaking, the cattle are poor, boney animals. The State Government, however, is endeavouring to promote the breeding of a better class of cattle, and has instituted a stud book for pedigree animals, including cattle, horses, pigs, &c. Cattle and agricultural shows, organised by private societies, are occasionally held in the country, and one on a larger scale is to be held shortly in Porto Alegre under the auspices of the Government.

Cattle of mixed breed already obtain a much better price than the

ordinary native stock, and breeders are beginning to recognise that it is to their own interest to introduce better blood. (Information as to the opening for the importation of pedigree stock into Brazil appears in the present number of this *Journal*, p. 485.)

Milking Machinery in Denmark.—It is stated that interest in practical milking-machinery continues to increase in Denmark. The cost, however, of the actual milking appliances without the motive power appears to be from about £2 15s. 6d. to £3 12s. per cow for 50 cows or over, £2 10s. per cow for 70 cows, and £2 4s. 6d. per cow for any number in excess of the above. Motors of two horse-power are estimated to cost £32; three horse-power, £55. The installation of milking-machines is, therefore, by no means cheap, and will not suit the pocket of the smaller dairyman.

Several milking-machines have now been introduced. Amongst these, a machine called "Denmark" is described as being a thoroughly efficient machine, though it works on the principle of continuous suction. The actual time taken by the above machine was 20 minutes for 15 lb. of milk. Other machines working by combined pressure and suction occupy, on the average, about eight minutes per cow.

An Australian milking-machine (the Lawrence-Kennedy-Gillies milking machine) is also reported as having given satisfaction. It is stated that the cows adapt themselves very quickly to the machine, and that no udder disease has been noticed in places where the milker has been employed.—(*F. O. Reports, Annual Series, No. 4,277.*)

Agriculture in Egypt.—Demand for Agricultural Machinery.—The Report on the trade of Alexandria (*F.O. Reports, Annual Series, No. 4,324*), contains a note by Mr. W. H. Cadman, B.Sc., F.C.S., on agricultural discoveries and inventions, new methods of agriculture and scientific research in connection with agriculture in Egypt in 1908.

It is mentioned that steam ploughs are becoming popular, over 150 sets of a particular British make having been imported during the past six years. At present the large and more costly engines and agricultural implements are only used on the large estates. Progress is slow, not so much on account of the initial expense as of the difficulty of transport and in finding skilled mechanics to operate and repair such machines. The high price of fuel is another drawback, but the recent promising discoveries of oil springs on the shore of the Red Sea may prove the means of a cheap fuel supply.

In order to encourage the employment of more modern machinery it has been suggested that the smaller agriculturists of each district should form associations for the purpose of purchasing machinery of which they realise the utility, such as steam engines, grain cleaning, threshing, reaping, and levelling machines, skilled mechanics being engaged to work and look after them. A movement in this direction has already begun in Upper Egypt, the engines and machines being hired by the smaller cultivators.

Agriculture in Germany.—The Report by Consul-General Sir Francis Oppenheimer on the Trade of the Consular District of Frankfurt (*F.O. Reports, Annual Series, No. 4,325*) contains information as to the German tariff and its effect on the agricultural industry and prices, the supply of agricultural labour, and other subjects.

Production of Calcium Cyanamide.—The same Report gives informa-

tion as to the companies which have been established for the manufacture of calcium cyanamide. A note on the same subject from H.M. Consul at Berlin appears in the *Board of Trade Journal* (August 19th), in which it is mentioned that in full working order the principal German works, at present engaged can produce about 21,500 tons of nitrate of lime per annum.

The number of samples examined at the Government Laboratory for the Board of Agriculture and Fisheries in the year ended March 31st,

**Analyses at the
Government
Laboratory.**

1909, was 2,665, as compared with 2,303 in the previous year, and of these 1,901 were samples of butter, margarine, and milk taken at the ports by the Customs officers. The principal chemist (Dr. Thorpe, F.R.S.), in his annual report [Cd. 4,771, price 3d.], states that no sample of butter was reported as containing foreign fat, while as regards margarine there were 14 cases in which the legal limit for water was exceeded, but in no case was there evidence of more than the legal quantity of butter-fat.

Besides the samples of imported produce, a number of samples taken under the Butter and Margarine and other Acts were analysed, as well as 120 samples referred by magistrates under the Food and Drugs Acts, and 35 samples referred under the Fertilisers and Feeding Stuffs Acts.

The Board of Agriculture and Fisheries are informed that temporary shows will be held at the Brussels Exhibition of 1910 as follows:—Flowers, April 30th to May 3rd; fruit growing and market gardening, September 24th to 27th; and flowers and chrysanthemums, October 27th to November 2nd.

With the object of ascertaining the extent and prevalence of the Large Larch Saw Fly (*Nematus Erichsoni*) in N. Wales, the Board have sent an Inspector to visit some of the larch plantations and to report. There are indications that the infestation is fairly widespread, and in order to fix some standard by which the intensity of an attack can be judged and its economic importance measured, the following scale has been prepared, which will be adopted in all future reports on the prevalence of the pest.

**Larch Saw Fly
Attack in
N. Wales.**

Highest degree of intensity (prevalence).—Some trees already dead, others with crowns thin and browned, numbers of defoliated twigs on trees, general appearance moribund.

Second degree.—No trees dead, no terminal shoots produced in the current year, dwarf shoots thereby stimulated to sprout, forming fresh green shoots in which eggs are laid.

Third degree.—No trees dead, terminal shoots present, but numbers attacked and eggs laid in them.

Fourth degree.—No trees dead. Terminal shoots present, and very few attacked.

The Destructive Insects and Pests Order of 1908 requires the occupier of any premises on which the disease known as Wart Disease or Black

**Warning to
Potato Growers**

Scab of Potatoes (*Chrysophlyctis endobiotica*, Schilb.) is discovered, to report the fact to the Board, with particulars of the date and place of discovery. A specimen of the diseased potato should be sent where practicable. Failure to report such discovery renders the occupier liable to a fine of £10.

All letters should be addressed to the Secretary, Board of Agriculture and Fisheries, 4, Whitehall Place, London, S.W. Letters so addressed need not be stamped.

A leaflet describing this disease, which is also known locally as Cauliflower Disease, Canker Fungus, Acker Spruit, &c., can be obtained, post free, on application to the Secretary of the Board.

The reports received from the Crop Estimators of the Board on August 15th generally indicate an improvement in the condition and prospects of all the principal crops with the exception of hops, largely owing, in the case of the corn crops at least, to the sunshine and warmth of the first half of August.

**Report on Crop
Prospects in August.**

Barley seems to have made the most progress of the three corn crops, and its prospects are now regarded as equal to those of wheat. Oats are a poor crop in England, but improvement is frequently mentioned, and this crop may be marked one point up on the month.

Spring Beans are reported as badly blighted by fly and a poor crop; winter Beans are generally good. Very variable reports—from poor and indifferent to very good—have been received concerning Peas.

Potatoes have slightly improved, and may be ranked with wheat and barley as the best crops of the year. Roots are on the whole good; an improvement in mangolds is noted in many districts, though the prospects for them are generally less bright than those for turnips and swedes.

Hay and grass, although the season's yield is a bad one, show an advance of two points on the month, chiefly owing to the improvement of pastures, and, in some cases, good second crops, as a result of the July rains. The yield of hay is light, except in a few places, particularly in Scotland, where the crop was sufficiently late to benefit by the wet weather.

Hops, in spite of continued washing for two months past, are still described as very seriously affected by blight, and the yield appears certain to be even lower than was anticipated in July.

The supply of labour is reported to have been generally sufficient during the hay-making; and an adequate supply is anticipated for the corn harvest, although much cutting will have to be done by hand, as the crops have been laid in many parts of the country.

Summarising the reports, and representing an average yield by 100, the appearance of the crops in mid-August indicated yields for Great Britain which may be represented by the following percentages:—Wheat, 105; Barley, 105; Oats, 97; Potatoes, 105; Roots, 104; Hay, 94.

Summaries of the condition of the different crops in each district are included in the Report. The state of the Hop crop is given as follows :—

Hop Crop.—In *Kent*, attacks of aphids have continued persistently, and where continual washing has not been carried on there may be no hops to pick. It is thought by some estimators that the quality may be good if fine weather continues, but a low yield is expected, one estimator even speaking of the crop in his district as the smallest since 1882. In *Surrey*, *Sussex*, and *Hants* the continued cold and damp weather of July has made the outlook bad, the aphid attacks having been exceptionally severe. Reports from *Worcestershire* show that the unceasing attacks of blight have caused a persistent washing, but an improvement with the August sunshine is reported. In *Hereford* many yards are said to be a failure. One estimator in this county forecasts an average yield for his district of $3\frac{1}{2}$ to 4 cwt. per acre, with an outside limit of 5 to 8 cwt. on best soils where the crop has been well washed.

The weather during the first day or two of August was dull and cloudy, but then became bright and fair, so that on the whole the first week was favourable. Rainfall was "heavy"

Notes on the Weather in England E. and N.E., "very light" in and Crops in August. England S.E. Sunshine was "abundant" in every part of England except N.E.

The second week was very fine and bright, warmth being "unusual" or "very unusual" everywhere. Rainfall was "very light" or "nought," and sunshine "abundant" or "very abundant." The thermometer rose to 89° in England S.W.; but the range of temperature during the week was very great, as much as 42° in one instance.

The weather became unsettled soon after the third week began, and rain, often accompanied with thunderstorms, was frequent. In England E. and N.W. the rainfall was "heavy," in England N.E., S.E., and the Midlands it was "very heavy." Sunshine was "moderate" to "scanty."

During the fourth week the unfavourable conditions continued. Warmth was "deficient" everywhere, except in England N.E., where it was "moderate." Rainfall was "heavy" in England S.E. and Scotland W.; "moderate" elsewhere, except in the Midlands, where it was "light." Sunshine was generally "scanty."

The reports received from the Board's correspondents in Berkshire indicate that the hot weather at the beginning of August enabled the farmers in that district to cut and put some of the wheat in stack, but as a rule harvest was after that time carried on under difficulties. One correspondent states that many samples of corn with un-matured grains were seen, and that from the samples of wheat he saw threshed on the 30th and 31st August both colour and quality will be second-rate. On the other hand, it is said that very little corn has sprouted, as the temperature was low. Roots have thriven wonderfully well, and the pastures were never better. There seems to be great uncertainty as to the extent of the plum crop. One correspondent describes plums as scarce, another as plentiful, but backward. Both write from practically the same district.

World's Wheat Crop.—According to estimates made by two of the leading Corn Trade papers, the wheat crop of the world for 1909 is likely to be considerably above the figures for the two previous years.

Notes on Crop Prospects Abroad.

The following table shows the total production compared with that of previous years as given in *Beerbohm's Corn Trade List* (August 20th), and in *Dornbusch's Evening List* (August 20th). Beerbohm's figures are given in quarters of 480 lb., while Dornbusch's are in measured quarters.

	Beerbohm.	Dornbusch.
	In thousands of qrs.	
1909	421,120	421,470
1908	397,840	392,486
1907	395,175	390,804
1906	431,955	422,655
1905	414,735	416,659
1904	392,660	388,088

World's Grain Crops.—The Hungarian Minister of Agriculture issued his preliminary estimate of the world's Grain Crops on August 31st, based as regards foreign countries on Austro-Hungarian Consular reports, and as regards Austria and Hungary, on the official Government reports. The estimates for last year are also revised. The wheat crop is put at 430,520,000 qrs. (of 480 lb.), as compared with 397,810,000 qrs. for 1908.

The totals for the various crops are as follows:—

	1909. Thousands of qrs.	1908. Thousands of qrs.
Wheat	430,520	397,810
Rye	204,990	198,040
Barley	203,720	179,600
Oats	459,579	397,450
Maize	478,240	449,010

The deficit of wheat in the importing countries is estimated at 71,454,000 qrs., while the surplus available for export in the exporting countries is 80,804,000 qrs.

Russia.—A report from H.M. Consul-General at Odessa, dated August 24th, and an earlier report, dated August 12th, from the British Consul at Kieff, show that the general condition of the crops in their respective districts is satisfactory.

Germany.—The report of the Imperial Statistical Bureau on the state of the crops in the middle of August, gives the arithmetical condition as follows:—Winter wheat, 2'7; spring wheat, 2'4; winter rye, 2'5; spring rye, 2'4; barley, 2'3; oats, 2'2; and potatoes, 2'3. The reports received as regards winter cereals are generally very favourable, and spring-sown corn was nearly everywhere reported as satisfactory or good; oats in particular had much improved since the previous month.

The condition of potatoes was at the date of the report somewhat less favourable in many districts than in July. Insect pests and fungi were rather prevalent. In most parts of the Empire, however, the potato crop had made good progress.

In a statement issued on September 1st by the German *Landwirtschaftsrat*, the probable yield of crops in Germany is estimated as follows, expressed as percentages of an average crop:—Winter rye,

101 0; spring rye, 92'3; winter wheat, 94'8; spring wheat, 97'4; barley, 102 4; and oats, 105'8.

The Imperial Statistical Bureau published on September 2nd the figures showing the area under crops in June, 1909. They are as follows :—

	1909. acres	1908. acres.
Winter wheat	4,044,777	4,145,727
Spring wheat	580,821	509,228
Total	4,625,598	4,654,955
Rye	14,897,528	15,116,721
Barley	4,066,618	4,024,314
Oats	10,643,931	10,558,751
Potatoes	8,209,621	8,132,840
Hops ..	71,553	88,587

Austria.—The report of the Ministry of Agriculture on the condition of the crops in the middle of August states that the harvest has been delayed by two or three weeks owing to the weather. The quality of the grain is generally very good. The wheat crop is backward, and varies considerably in different districts.

Hungary.—According to the report of the Hungarian Ministry of Agriculture for the middle of August, it appears that the wheat crop is of good quality on the whole, though the yield is materially less than that of 1908. Barley is satisfactory both in quality and quantity. Potatoes have suffered in some places from want of rain, but the early crop has proved satisfactory, while the late crop promises to be fairly good, and in places very good.

Early hops have been gathered with moderate results, and the quality is good. Later hops promise to give a satisfactory crop.

The yields are now estimated as follows :—

	1909. qrs	1908 qrs.
Wheat	15,360,000	18,117,000
Rye	5,702,500	5,526,000
Barley	8,544,000	6,737,500
Oats	9,603,000	7,250,000
	cwts	cwts
Maize	83,478,000	75,907,000
	tons	tons
Potatoes	4,541,000	4,771,000

Canada.—According to the report of the Census and Statistics Bureau for August, the percentage condition of the principal crops on July 1st was —Winter wheat, 76 53; spring wheat, 84 57; oats, 87 78; barley, 83 84; and potatoes 92 03.

It was too early at the end of July to procure estimates of spring grains for the maritime provinces, but for Quebec, Ontario, Manitoba, Saskatchewan, and Alberta, with an area of 7,022,000 acres in spring wheat, the estimated yield is 22 60 bushels per acre, which makes an aggregate of 158,762,000 bushels. Spring and winter wheat taken together show a total in the five provinces of 174,314,000 bushels grown on 7,684,300 acres. Last year the area was 6,541,900 acres, and the estimated yield at the same date was 130,263,000 bushels, which was afterwards reduced by unfavourable weather in August.

The barley crop of the five provinces has an area of 1,846,900 acres, as compared with 1,726,700 acres last year, and a estimated yield of 57,722,000 bushels, as against 51,690,000 bushels at the same date last year.

Hop Crop of Various Countries.—Messrs. John Barth and Son, of Nuremberg, in their report of August 24th, state that the warm and fine weather which prevailed since their previous report of July 28th (*Journal*, August, 1909, p. 420) has stopped a further deterioration of the hop plantations in Bavaria. The vermin and the blight have disappeared in nearly all districts, but unfortunately too late for an improvement of the bad gardens. Those plantations, however, which were less injured show an improvement, and a so-called head-yield is expected from them, which means that only the upper part of the plant is productive.

The Hallertau of Bavaria is especially favoured; bad fields in some districts are hardly to be seen, and Messrs. Barth believe that nearly 100,000 cwt. will be produced here, against 145,000 cwt. of last year, whereas in the Spalt country the harvest will hardly equal one half of that of last year. The mountainous and country districts of Bavaria are only expected to harvest a few thousand cwt., against 145,000 cwt. in 1908.

It will depend on the weather of the next few weeks how much Germany will yield over or under 200,000 cwt., as against 536,000 cwt. last year. Austria-Hungary is expected to produce fairly well in the district of Saaz; and the yield of the whole of Austria-Hungary is estimated at 180,000 cwt., as against 321,000 cwt. last year. Reports from France and Belgium are not favourable, but a good return is expected from Russia.

Messrs. Barth estimate the yield in England at 220,000 cwt., against 500,000 cwt., while the yield in the United States is put at about 350,000 cwt.

On the whole, therefore, this year's world's crop of hops is approximately estimated at about 1,000,000 cwt., against 2,014,000 cwt. in 1908, subject to slight alterations according to the weather.

The consumption of hops in the whole world amounts approximately to 1,700,000 cwt., so that this year's deficit is rather large, but substantial quantities of old hops are stored in breweries, and are likely to prevent high quotations.

Hop Crop in Hungary.—H.M. Consul-General at Budapest, in a report, dated August 5th last, states that the first reliable data as to this year's hop crop in Hungary have been recently published. In Siebenburger (Transylvania) it is expected that 30 per cent. of the crops will be good, 60 per cent. middling, and the remainder poor. On the Alfold 35 per cent. of the crop is estimated as good, 60 per cent. middling, and 5 per cent. weak; south of the Danube 16 per cent. good and 70 per cent. middling, while in North Hungary the crop appears to be on the whole satisfactory.

Area Under Hops in Russia.—According to the *Recueil de données statistiques de l'industrie agricole*, 1908, the cultivation of the hop in Russia is chiefly practised in the Government of Volhynia, where the area in 1902 was 6,210 acres. In Poland 3,078 acres were grown, and areas in other districts brought the total up to 15,687 acres, with a

production of 78,107 cwt. It is believed that there are no complete figures as regards the area for a later year.

Mr. Consul-General Smith's Report on the District of Odessa (*F.O. Reports, Annual Series, No. 4,295*) states that the crop of hops in 1908 was very short, amounting for the whole of European Russia to 4,350 tons, as compared with 5,670 tons in 1907, 4,850 tons in 1906, and 6,450 tons in 1905. Mr. Smith states that more than one-half of the supply comes from Volhynia, and that the industry is extending.

Argentina.—H.M. Consul at Rosario (Mr. H. M. Mallet), in a despatch dated August 4th, states that rain has now fallen, abundantly in some parts, and the outlook for both agricultural and live-stock interests has accordingly improved. It was too early to estimate what the harvest will yield, but although less land has been under cultivation this year, there was, given favourable weather, every prospect at the date of the despatch of an average wheat crop. As regards live stock, losses are likely to be severe in some districts until the spring grasses grow.

United States.—The Crop Reporting Board of the United States Department of Agriculture states that the average condition of maize on September 1st was 74.6, against 84.4 on August 1st, 1909, 79.4 on September 1st, 1908, and 80.6 the average of the previous ten years. The average condition of spring wheat at harvest was 88.6, as compared with 77.6 on September 1st, 1908, and 78.3 the five-year average. The average condition of oats at harvest was 83.8, against 69.7 on September 1st, 1908, and 79.8 the mean of the averages for the previous ten years. The average condition of barley when harvested was 80.5, against 81.2 on the same date last year, while potatoes averaged 80.9, against 73.7 in 1908 and a ten-year average of 80.4.—(*Dornbusch, September 8th, 1909.*)

The Board of Agriculture and Fisheries have been furnished by the Board of Trade with the following report, based on about 210 returns

**Agricultural Labour
in England
during August.**

from correspondents in various districts, on the demand for agricultural labour in August. Work on the land was considerably hindered by wet weather during the latter part of August, and many day labourers lost time in consequence. The corn harvest required more hand labour than usual on account of crops being laid by rain, and generally, when fine, the supply of day labourers was equalled by the demand; in certain districts, however, it was reported that the demand for extra labourers was lessened by the lateness of the corn harvest, other work having been finished before this was begun.

Northern Counties.—Employment was fairly regular in *Northumberland* and *Cumberland*, haymaking, thistle cutting, hoeing, &c., causing a fair demand for extra labourers. Men of this class, however, lost time through wet weather towards the end of the month. The weather also interrupted employment in *Westmorland* and *Lancashire*, where otherwise the supply of and demand for labour were generally well balanced. Wet weather and the lateness of corn harvest somewhat

affected the demand for day labourers in *Yorkshire*, but haymaking and turnip hoeing afforded a fair amount of work.

Midland Counties.—Employment was generally regular in *Cheshire*, and a good demand for labour was reported. Some irregularity of employment on account of bad weather was reported in *Derbyshire* and *Nottinghamshire*. Finishing the hay harvest, commencing the corn harvest, and hoeing roots provided fairly good and regular employment in *Leicestershire*. There was a fairly good demand for extra labourers in *Staffordshire* and *Shropshire*, but men of this class lost time in many districts on account of wet weather and the lateness of corn harvest, which was not ready to be commenced when other work was finished. In *Worcestershire* fruit picking and the corn harvest caused a fairly good demand for day labourers, which was generally met by the supply. A scarcity of carters and stockmen was reported in the Pershore Union, and of stockmen in the Shipston Union. There was a good and fairly constant demand for extra labour in *Warwickshire* on account of the hay and corn harvests. Day labourers were somewhat hindered by rain in *Northamptonshire* and *Oxfordshire*, but most men found employment in fine weather. Hoeing and haymaking, and latterly the corn harvest, afforded fairly full employment in *Buckinghamshire* and *Hertfordshire*. Only a moderate demand for extra labourers was reported from *Bedfordshire*.

Eastern Counties.—The corn harvest was delayed by rain in *Huntingdonshire* and *Cambridgeshire*, and there was some irregularity of employment for day labourers in consequence. Day labourers in *Lincolnshire* generally had regular work at hoeing and corn harvest; the supply of and demand for such men were about equal. In *Norfolk* the demand for extra labourers was somewhat slack until the latter end of the month, when the corn harvest became general. Rain interfered with harvest operations in *Suffolk* and *Essex*, but the demand for extra labour in these counties was generally balanced by the supply.

Southern and South-Western Counties.—The corn harvest in *Kent* was somewhat interrupted by rain towards the end of the month, and some day labourers lost time. In several districts the supply of such men was in excess of the demand. There was generally a full supply of extra labour in *Surrey*, but work was plentiful when the weather permitted. Rain caused some interruption to harvest work in *Sussex* and *Hampshire*; day labourers in these counties were generally in demand for the corn harvest. Correspondents in the Petworth (*Sussex*) and Droxford (*Hants*) Unions refer to a scarcity of men for permanent situations. More labour than usual was required for the corn harvest in *Berkshire* and *Wiltshire* on account of crops being laid by rain, but many extra labourers were in irregular work through bad weather. Hoeing and harvesting provided a good deal of work for day labourers in *Dorset* and *Somerset*. The supply of labour was generally equal to the demand, though bad weather, as elsewhere, caused some loss of time. Employment was fairly regular in *Herefordshire* and *Gloucestershire*, with a sufficient supply of extra labour. Haymaking, hoeing, potato digging, and the corn harvest generally maintained a full demand for day labourers in *Devon* and *Cornwall*.

THE CORN MARKETS IN AUGUST.

C. KAINS-JACKSON.

The tendency towards declining prices has been persistently resisted in the rural markets during August, and until the last few days of the month less than forty shillings per quarter was not accepted for wheat. The great ports, on the other hand, including London, showed a readiness, after the beginning of the month, to accept reduced quotations. The whole course of the markets which are mainly dependent on foreign corn has been against the seller.

Wheat.—Up to the very end of the month the threshings of new wheat had been hardly worth mentioning, while the old crop was almost entirely exhausted even before August arrived. At several country markets during the last fortnight no wheat was on sale at all, and the total sales for the statute markets during August were smaller than for any previous August since the advent of the new century. Hitherto July has held all records in the matter of short deliveries; that month in 1905, 1906, and 1909 showing the three lowest totals recorded. The price of English wheat still averaged as much as 45s. 8d. at Doncaster at a date past the middle of the month, but before August closed 36s. 5d. had been accepted at Chichester, and the very low price of 33s. 10d. was recorded from Salisbury. North of the Thames prices were generally higher than in the South, while in the southern counties condition was damp and unsatisfactory. Damp and “unfit” wheat does not always go to the fowls, but the miller who keeps and conditions it does not do so gratis; the fee comes out of the price. Economically this is so much loss, for the miller does not care for the trouble, and the farmer wishes for a full price. If a broken harvest cannot be obviated, a saving both of money and labour would result from the farmer keeping his corn until it was fit for the mill. He has the room for the stacks, and in most cases he has accommodation in his barns for threshed corn as well.

The fall in foreign wheat has reduced values off stands to 45s. 6d. for best American, 44s. 6d. for Australian f.a.q., 43s. 6d. for long-berried New Zealand, 42s. 6d. for short-berried New Zealand, 44s. for Argentine, f.a.q., 42s. for Indian White Wheat, and 41s. 6d. for Indian Red. These are London prices per quarter made at the last Mark Lane market of the month. At Liverpool on the 31st, 7s. 8½d. per cental (or 37s. per 480 lb.) was accepted for American New Red Wheat f.a.q., guaranteed delivery before the end of September. Readers of market reports should note that the so-called “bearishness” of American and other Term prices is at least part payment for advantages; the London prices, for example, are all above 40s., compared with which the leading Liverpool price of 37s. looks very depressed. It is, in fact, the price of a poor market, showing a fall of 2d. per cental on the week, but the seller got advantages which the London merchant did not. The latter, if he took his price, had to deliver *ex* warehouse to buyer's order. At Liverpool the seller had a clear month in which to deliver at his own convenience, and had four weeks' markets on which himself to buy if so disposed. The buyer on August 31st, who is not sure of his grain before September 30th, needs a tempting price if he is to stand

ready to receive the corn for thirty days, and has also to provide not less than a clear month ahead for his own outgoings.

The shipments of wheat for August were 773,000 qrs. from North America, 277,000 qrs. from South America, 983,000 qrs. from Russia, 459,000 qrs. from Roumania and Bulgaria, 880,000 qrs. from India, and 54,000 qrs. from Australasia. British possessions have shipped a very fair proportion of the whole; the North American total includes substantial quantities of Dominion wheat. The supply on passage has changed very little; 2,210,000 qrs. on the 1st, and 2,005,000 qrs. on the 31st of the month. Imports were fairly liberal in themselves, but, in a month when home deliveries were at a low ebb, did not fully meet requirements as ordinarily estimated.

Flour.—It has been a good month for bakers so far as prices are concerned, for while Household Flour for cash has fallen from 34s. to 32s. 6d. per sack, bread has undergone no modification as a rule. On the other hand, the sales of bread were very small, abundance of green vegetables being a probable cause of reduced demand. The price of the finest grades of flour has not been altered, as supply has been small. The country mills are adopting in some cases the American policy, and on the 30th, at Mark Lane, one could buy country flour for September delivery at 31s. 6d. Roller Whites, and for October delivery at 30s. 6d. These low prices mean that the millers accept them in exchange for the advantage of delivery when they please, so long as it is within the month indicated. America at the close of the month was offering to ship best Minneapolis at 34s. 9d., ordinary Minnesota First at 31s. 9d., and Kansas ordinary at 29s. 6d., prompt shipment. If, however, October shipment would serve, these three prominent types could be had at 31s., 29s., and 28s. respectively. North America in August shipped 297,000 sacks.

Barley.—The broken weather caused serious apprehensions as to the finer malting samples getting stained and depreciated. The trade in heavy barley was practically at a standstill. Grinding barley was quoted a guinea per qr. for Russian at the end of the month. Russia shipped 1,078,000 qrs., but there were only 305,000 qrs. of all sorts, including Californian, on passage on the 31st. Quite unusually heavy purchases for the Continent are incidentally disclosed.

Oats.—New winter oats came on sale at Mark Lane on the 9th, 20s. to 22s. per 336 lb. being asked. Before the month was out prices had fallen, 19s. to 20s. commanding ordinary 320 lb. grade. The winter oats, however, have come in handily and sold well. The ordinary spring crop did not make its appearance in appreciable quantity before the 23rd, but during the last few days of the month sold freely at 17s. to 18s. per 312 lb. lots, 18s. to 20s. for 320 lb. corn, and up to a full guinea for good heavy Gartons, Pathfinders, Abundance, and other named oats. Foreign sorts were cheap, for the prevalent 304 lb. sorts, Argentine and Russian competing sharply at 17s. Some better quality Vologda oats made 18s., and newly arrived South African fetched 17s. 6d. per qr. August shipments were 19,000 qrs. from North America, 103,000 qrs. from South America, and 353,000 qrs. from Russia. The supply on passage is small, but very heavy contracts for October and November shipment from Russia are said to have been signed.

Maize.—In round numbers the cereal year which ended on 31st ult. imported nine million quarters of Indian corn, and as reserves are known to be remarkably small, it may be premised that the standard of our import wants considerably exceeds that total. A great increase in maize imports is predicted for 1909-10, as the American surplus is expected to be a record one, and the belief is the sounder because based not on any hope of a record yield per acre (which an untoward September might dissipate), but on anticipation of an average yield on a record area sown. There have been free buyers of this new crop all through August at 24s. or thereabouts, the price bid going up at times to 25s. if shipment by fast steamer could be guaranteed for December, and falling to 23s. where only sailing ships for February were offered. The spot business (at 26s. or thereabouts for any f.a.q. maize) has been quite dwarfed. The August shipments were 37,000 qrs. from North America, 1,535,000 qrs. from South America, 237,000 qrs. from Russia, and 197,000 qrs. from Roumania and Bulgaria. The 900,000 qrs. on passage on 31st was mainly Argentine, but included some South African as well as Russian and Roumanian maize.

Pulse.—There were few changes during August. Despite civil war a fair supply of beans from Morocco was received and sold at 32s. 6d. per 480 lb. or thereabouts. Manchurian peas at 32s. 6d. per 504 lb. also found a steady sale. The long voyage is rendered practicable by the extraordinary cheapness of freights. There is an increasing sale of all pulse in the split form at Mark Lane.

Oilseeds.—The price has declined a little for all descriptions. New English linseed is offered at 54s. per 416 lb., and new rapeseed at 60s. per 424 lb., but the quantities available are meagre. The Indian linseed offered at 47s. or thereabouts commands a fair sale. The fall in cottonseed to £7 10s. per ton has attracted buyers, and while this used to be called a good price, the demand is so steadily augmenting, the production so dubiously keeping pace with it, that those who take fairly long views incline more and more to advise buying at anything under 8s. per cwt. for best Egyptian and at lower prices, in proportion, for grades inferior to the best. August shipments of linseed were 290,000 qrs. from South America and 103,000 qrs. from India. On the last day of the month there were on passage 160,000 qrs. of linseed, 10,000 qrs. of rapeseed, and 13,000 tons of cottonseed, all under-average expectations.

Farm Seeds and Minor Staples.—Canary seed, which has been increasing of late in general use as a feeding-stuff, does not look like being cheap, at all events in the near future. Nothing is to be had under 50s. per 464 lb., and the price of good Turkish, Morocco, and Argentine goes up to 55s. per qr. New Rye Grass Seed has been selling at about 25s., and other prices for farm seeds of English growth include choice red cloverseed at 62s., cowgrass seed at 70s., fine white cloverseed at 64s., fine alsyke at four guineas, early trifolium at 40s.; all per cwt. Foreign seeds fetch 60s. for best red cloverseed, 28s. for good trefoil, and 78s. for best Lucerne. A fair inquiry exists for Lincolnshire and West Norfolk mustard seed at 22s. per cwt. for best, and 18s. for f.a.q. Lentils, at 40s. per 504 lb. for Egyptian, are quite above ordinary ideas for feeding purposes.

THE LIVE AND DEAD MEAT TRADE IN AUGUST.

A. T. MATTHEWS.

Fat Cattle.—The month began with a Bank Holiday market at Islington on the 2nd, when there was a larger supply than the week before by about 60 head. As usual on such occasions, there was a meagre attendance of buyers and business was slow, but still all were sold without any quotable reduction in prices. The trade in the country markets was also firm during the ensuing week, and the average for Shorthorn bullocks of first and second quality was precisely the same as that of the last week of July, viz., 8s. 5½d. and 7s. 7½d. per 14 lb. stone. The other breeds are quoted in far smaller numbers, but the Herefords, the relative condition of which was much better than that of the Shorthorns, advanced nearly 1d. for first quality. The highest markets were Ipswich, Ashford, Basingstoke, Newcastle, and Preston, at each of which first quality Shorthorns were quoted at 8s. 9d., while Bristol was again the lowest at 8s. 1d. A great change in the weather set in suddenly about August 3rd, and the trade in the second and third weeks was much affected by the great heat, which caused serious losses to butchers and retailers. In the week ending the 12th, no fewer than 26 out of 37 leading markets were described as being more or less cheaper, and in 23 markets quoting Shorthorns, the general average declined to 8s. 3¼d. for first and 7s. 5d. for second quality, being a fall of 2¼d. and 2½d. per 14 lb. dead weight. The averages of other breeds for first and second quality were:—Herefords, 8s. 5d. and 7s. 5½d.; Devons, 8s. 7½d. and 7s. 10½d.; Welsh Runts, 8s. 3½d. and 7s. 6d.; Polled Scots, 8s. 7½d. and 8s. 3½d. Only three markets quoted Shorthorns as high as 7½d. per lb. in the second week. Although the hot spell broke up on Monday, the 16th, its effects were visible in the trade for the whole of the third week. There was a better trade at Hull, Aberdeen, Edinburgh, Inverness, and Dundee, but all other markets were either lower or unchanged in value. The English markets averaged a further decline of 1½d. per stone for first quality Shorthorns, but, curiously enough, the second quality average was quite unchanged. This unusual feature may be accounted for by the preference given to leaner beef during hot weather. Another peculiarity of that week's trading was the fact that while Herefords maintained their previous value of 8s. 5d. for first, their second quality advanced 1d. per stone. Devons gave way 2d. for both first and second quality. The fall in Welsh Runts was 2½d. on first and 1½d. on second quality, and that in Scots was even more singular, being no less than 4½d. for first but only ½d. on second quality.

The inference which it seems fair to draw from these figures is that very fat cattle lose in relative value in hot weather, but with regard to comparisons between breeds it should be remembered that the Shorthorn quotations are the most reliable guide to market movements, as they are so much more generally quoted. No market was quoted higher than 8s. 6d. per stone for this breed in the third week.

In the fourth week the markets were steadier in tone and the mean value of Shorthorns was well maintained, with very little change in that of other breeds, especially when the condition of so large a proportion of the animals on offer is taken into account. At the end of the

month there was a marked scarcity of prime animals, and these made very high prices in Scotland. At Edinburgh 45s. 3d. per live cwt. was recorded, 44s. 6d. at Perth, and 44s. 3d. at Glasgow. The month ended with a clearly defined improvement in the demand at Islington on the 30th, when the market was cleared early at a general advance of $\frac{1}{2}$ d. per lb.

Veal Calves.—There was no change in the first week's average value of fat calves from that of the last in July, the mean quotations of 24 British markets being $7\frac{1}{2}$ d. for first and 7d. for second quality. The highest quotation was $8\frac{1}{2}$ d., and that was only touched at Ruthin. There was an advance of $\frac{1}{2}$ d. per lb. in the following week for first quality, which was lost during the third week. Prices subsequently remained firm to the end of the month.

Fat Sheep.—At Islington on the 2nd there were just under 5,000 sheep and lambs at market, and these were more than sufficient for Bank Holiday. Although business was slow, quotations showed that the advance of $\frac{1}{2}$ d. per lb., which had been established the week before, was about maintained. This was not the case everywhere, for the improvement then made in several markets was lost. Others, however, were better, and the average price of Downs, both of first and second quality, was about the same as the previous week, neither was there any material change in the quotations for Longwools. Trade was decidedly better at Leeds, Leicester, and Norwich, and slightly so at Derby. The next week there was a fall in the average of 18 markets amounting to about $\frac{1}{2}$ d. for first and second quality Downs, Longwools showing about a similar decline. The reports of the trade all over Great Britain were very unfavourable, no market being quoted higher and 25 being described as worse. It would be safe to say that the heat was answerable for the chief part of this added depression. The highest markets were Chichester, Dorchester, and Newcastle, but even at those 8d. per lb. was not exceeded for prime Downs. Shrewsbury and Wakefield were the lowest at $6\frac{1}{2}$ d. Fat ewes and heavy longwoolled wethers, such as the two-year-old sheep of the Romney Marsh breed, a large number of which were on offer in London, were extremely unsaleable, ewes being only worth $4\frac{1}{2}$ d. per lb. The next week there was a falling-off in the supplies of fat sheep in our six largest markets of over 5,000 head compared with the second week, which was equal to about 8 per cent., but there was no improvement in values. From this time to the end of the month the trade remained very quiet and dull, with extremely little change in values. Downs left off with an average of $7\frac{1}{2}$ d. per lb. for prime small sheep of about 64 lb. in weight and $6\frac{1}{2}$ d. for second quality, i.e., wethers of 80 to 88 lb. There was a fractional decline in prime Longwools, which averaged about $6\frac{1}{2}$ d. and 6d. per lb. for first and second quality respectively. At the last August market at Islington there were 6,110 sheep and lambs on offer. The values on that day were extremely difficult to estimate owing to the very wide variations of breed, size, and quality, added to which, whole classes being almost devoid of offers, quotations were often merely nominal. A large number were left unsold, and the reported reduction of $\frac{1}{2}$ d. per lb. all round was really a doubtful description of actual transactions.

Fat Lambs.—These met with a somewhat variable trade at the

beginning of the month, but, on the whole, it was scarcely so depressed as that for grown sheep. There was a good demand for half-breeds at Lincoln and some other places, but the average price was a little lower than at the end of July. Prime lambs averaged 8½d. and second quality 7½d. per lb. In the second week there was a further fractional decline, followed in the next by a heavier one, amounting to ½d. per lb. for both first and second quality, taking the mean of 38 British markets. The last quotations of the month showed an average of 8d. per lb. for first and 7d. for second quality.

Fat Pigs.—There were no signs of any falling-off in the demand for pigs in the first week, and bacon pigs fetched an average of 7s. 3½d. per stone in 27 markets of England and Scotland for prime small weights. Heavy pigs, however, were scarcely so dear. In spite of the brisk demand the weather told against values, and these declined in the second week to an average of 7s. 2½d. for first and 6s. 7½d. for second quality. The following week prime small bacon pigs were 1d. per stone cheaper, while heavy ones declined 1½d. The prices for the month finished at about 7s. 2d. and 6s. 6½d. per stone.

Carcase Beef.—The trade in carcase beef was rather irregular, owing partly to the weather and partly to the erratic character of supplies. At the beginning of the month Scotch and English sides were firm, both in London and the great provincial markets. Scotch short sides were fetching 7½d. per lb. in London and long sides 6½d. for first quality. English was worth 5½d. to 6d. per lb. The supplies of port killed were light, and prices advanced ½d. per lb. in most places. American chilled was ¼d. lower, but Argentine was scarce and firm in value. Frozen hind quarters were fetching from 3½d. to 3¾d., and fore quarters 2½d. to 2¾d. per lb. The second week witnessed what might be termed weather markets, and for several days something approaching panic was experienced by holders in London. Many severe losses were sustained from tainting, and prices, of course, gave way all round, from ½d. to ¼d. per lb. In the third week there was no change in British beef, but Deptford killed was ¼d. cheaper. American chilled was firm, and Argentine, being scarce, advanced ¼d. per lb.

During the last week Scotch short sides advanced to 7½d. per lb., long sides remained at 6½d. to 6¾d., and English were firm at 5½d. to 5¾d., in London. Port killed finished at 5½d. to 5¾d., but the feature of the week was the very serious advance in chilled beef, American rising ½d. and Argentine 1d. per lb. The top price per 8-lb. stone of American was then 4s. 10d. for hind and 2s. 8d. for fore quarters, so that for the whole side the value was only ½d. per lb. less than that of English, an almost unprecedented occurrence. Even Argentine chilled was worth up to 6½d. per lb. for hind and 3½d. for fore quarters.

Veal.—The trade began very badly in London, and the difference between values in the Central Market and those of Liverpool and Leeds was even greater than usual. The highest price procurable in London for English was 51s. 4d. per cwt., while the Liverpool price was 67s. 8d., even second quality fetching 63s. There was some recovery later, and by the end of the month the London price was 6½d. per lb. for prime veal.

Carcase Mutton.—With the exception of a slightly firmer feeling in the third week, the carcase mutton trade was extremely depressed

throughout. Of course, the hot weather aggravated the situation, but the impression has become much stronger than it was some months ago that markets are overweighted by the excessive supplies of frozen carcasses. Values were very weak at the opening, Scotch selling at 6d. to 6½d. per lb. and English at 5½d. to 6d., while Dutch was making 5d. to 5½d. These were the nominal quotations, but with the best New Zealand at 2½d., much lower figures had to be accepted to force sales. As the month advanced there was still further weakness, and on the 25th the best Scotch was easily procurable at 6d. per lb. The slightly better feeling in the third week was attributed to the small arrivals of Dutch.

Lamb.—The value of lamb has been very low throughout. British started at 7d. per lb. for prime, with plenty of excellent quality at 6d. In the second week there was a decline of ½d. per lb., which was recovered during the third week, but only temporarily, and at the end of the month prices remained at the lowest point. The finest New Zealand varied from 3½d. at the beginning to 3¼d. at the close.

Pork.—The transactions in pork were, of course, very small, and the weather presented great difficulty. Supplies have been fairly regular, and the top quotation has varied from 6d. to 6½d. per lb. during the hottest month of the year.

THE PROVISION TRADE IN AUGUST.

HEDLEY STEVENS.

Bacon.—At the opening of the month the demand continued slow, but the improved weather conditions gave an all-round impetus to business, both wholesalers and retailers being short of stock, although the continuance of abnormally high prices has considerably curtailed the consumption, bacon being looked upon by many as a luxury rather than an everyday article of diet, as is the case when the cost is less.

During the third week of the month, when the weather was unusually hot, there was quite a run on all hog products, especially hams, resulting in smart advances in prices. American hams in some cases showed an advance of 5s. to 6s. per cwt. on the month, and all other American cuts advanced from 2s. to 5s. per cwt., on account of extreme scarcity. The arrivals from America are still unusually small, and the latest advices from that side point to further restrictions in the shipments for some weeks to come, possibly until the end of October, as their home demand continues good in spite of such high prices. Prices for hogs in the United States remain at a very high level, the top price for the month being \$8.30.

Danish bacon, on the contrary, was selling for less money by the end of the month, the demand being considerably less for this class of meat, as in very hot weather dealers are afraid to handle such lightly cured bacon. In order to effect a weekly clearance, irregular prices were accepted by the Danish agents.

This timidity of dealers in handling Continental produce improved the demand for English, Irish, and Canadian bacon, all being a more reliable cure. The arrivals from Canada continue to be unusually small, with no immediate sign of larger shipments. The Canadian home trade is good, and pigs are still very scarce and dear, although they were a little cheaper towards the end of the month.

English pigs have been marketed a little more freely, and prices have been slightly reduced. The outlook for the winter is for a continued shortage, and consequently prices above the average.

Cheese.—In comparison with July, the demand was much improved, and by the end of the month prices were generally firmer. With the warmer weather it was anticipated that the consumption would be much larger, but dealers are afraid to operate beyond their actual requirements at present prices, and consequently have not pushed the sale of this article.

The conditions in Canada have altered since last month. Weather being favourable, the make has materially increased, receipts into Montreal since the commencement of the season now showing an increase of about 45,000 cheese over the same period last year, and the shipments to the middle of August were about 52,000 more; but even with this increase the export has been less by 108,000 cheese than during the same time in 1907. Shipping prices for best August makes have averaged from 56s. 6d. to 58s. 6d., delivered in English ports. At the end of the month the estimated stocks at the three principal distributing centres (London, Liverpool, and Bristol) were 295,000, against 265,000 last year, and 304,000 two years ago.

Shipments from the United States are practically *nil*, prices being far above a competitive basis, the latest advices giving the quotations for best cheese as equal to 72s. per cwt. delivered here. The shipments from New York since the opening of the season to the middle of the month were 42,000 less than for the same time last year.

Most markets are now nearly cleared of New Zealand makes, and there is considerable speculation among merchants as to the price that is likely to be asked for next season's deliveries, in face of the anticipated large increase in the output. The arrivals into England from this country during the first five months of this year total over 100,000 cheese.

Butter.—There is no special feature to report in the month's trading. The demand has been only moderate and fluctuations in prices small. During a portion of the month the pastures in Ireland suffered somewhat from want of rain, but by the end of the month the conditions had altered and the make increased.

Canada has sent us a little butter during the month, but the quantity was considerably below that of last year, their home trade paying better prices than we can afford. The receipts into Montreal up to the present time have been about 25,000 packages less than for the same time last year.

Arrivals from Siberia have been plentiful, but on account of unsatisfactory prices large quantities are being held in cold storage at the Baltic ports, so that owners can take advantage of whichever market, England or Germany, is first willing to pay improved prices.

In the United States, the finest grades of Creamery Butter are realising prices equivalent to 135s. to 138s. per cwt., delivered in England.

Eggs.—As usual when fruit is plentiful, the demand has been less, but prices on the whole were firmer at the end of the month.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and SCOTLAND
in the Month of August, 1909.

(Compiled from Reports received from the Board's Market
Reporters.)

Description.	ENGLAND.		SCOTLAND.	
	First Quality.	Second Quality.	First Quality.	Second Quality.
FAT STOCK:—	per stone.*	per stone.*	per cwt.†	per cwt.†
Cattle:—	s. d.	s. d.	s. d.	s. d.
Polled Scots	8 5	8 1	40 9	37 4
Herefords	8	7 7	—	—
Shorthorns	8 3	7 6	39 9	36 4
Devons	8 6	7 10	—	—
	per lb.*	per lb.*	per lb.*	per lb.*
	d.	d.	d.	d.
Veal Calves	7½	7	7½	6½
Sheep:—				
Downs	7½	6½	—	—
Longwools	6½	6	—	—
Cheviots	7½	7	7½	6½
Blackfaced	7½	6½	6½	5½
Cross-breds	7½	6½	7½	6½
	per stone.*	per stone.*	per stone.*	per stone.*
	s. d.	s. d.	s. d.	s. d.
Pigs:—				
Bacon Pigs	7 4	6 10	6 9	6 1
Porkers	7 7	7 1	7 4	6 7
LEAN STOCK:—	per head.	per head.	per head.	per head.
Milking Cows:—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk ...	21 8	17 19	22 1	17 15
„ —Calvers... ..	20 14	17 12	20 0	16 19
Other Breeds—In Milk ...	19 1	14 7	19 5	15 17
„ —Calvers	14 10	13 0	19 8	15 13
Calves for Rearing	2 3	1 14	2 11	1 13
Store Cattle:—				
Shorthorns—Yearlings ...	9 18	8 9	10 0	8 5
„ —Two-year-olds... ..	13 15	12 3	15 10	12 6
„ —Three-year-olds ...	17 10	15 3	17 0	—
Polled Scots—Two-year-olds	—	—	15 10	12 7
Herefords— „	15 2	14 4	—	—
Devons— „	14 7	12 13	—	—
Store Sheep:—				
Hoggs, Hoggets, Togs, and Lambs—	s. d.	s. d.	s. d.	s. d.
Downs or Longwools ...	29 2	24 6	—	—
Scotch Cross-breds ...	—	—	23 6	19 2
Store Pigs:—				
Under 4 months	24 10	19 1	22 11	19 5

* Estimated carcase weight.

† Live weight.

**AVERAGE PRICES of DEAD MEAT at certain MARKETS in
ENGLAND and SCOTLAND in the Month of August, 1909.**

*(Compiled from Reports received from the Board's Market
Reporters.)*

Description.	Quality.	London.	Birming- ham.	Man- chester.	Liver- pool.	Glas- gow.	Edin- burgh.
		per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
BEEF :—							
English	1st	54 6	55 0	54 0	—	60 6*	58 6*
	2nd	52 0	50 6	52 0	—	56 0*	51 6*
Cow and Bull .	1st	—	48 6	47 0	44 6	48 6	45 0
	2nd	—	43 0	43 0	39 0	39 6	38 0
U.S.A. and Cana- dian :—							
Port Killed ...	1st	55 0	53 6	53 0	55 0	54 0	55 0
	2nd	51 0	50 0	50 0	50 0	50 0	46 6
Argentine Frozen—							
Hind Quarters ..	1st	34 6	36 6	37 6	37 6	34 6	38 0
Fore " ..	1st	27 0	29 0	28 0	28 0	28 6	28 6
Argentine Chilled—							
Hind Quarters ..	1st	48 6	46 6	47 0	48 0	44 6	47 0
Fore " ..	1st	31 0	32 0	32 0	32 0	32 6	30 6
American Chilled—							
Hind Quarters—	1st	62 0	61 0	60 6	60 6	59 6	62 6
Fore " ..	1st	36 6	38 0	39 0	38 0	38 6	39 6
VEAL :—							
British	1st	56 0	60 6	62 0	66 0	—	—
	2nd	51 6	52 6	56 0	61 0	—	—
Foreign .. .	1st	58 6	—	—	—	—	53 6
MUTTON :—							
Scotch . . .	1st	59 0	—	—	—	62 0	55 6
	2nd	55 6	—	—	—	49 0	46 6
English	1st	56 0	61 0	57 6	56 6	—	—
	2nd	51 6	50 0	54 0	52 0	—	—
U.S.A. and Cana- dian—							
Port Killed .	1st	—	—	—	—	—	—
Argentine Frozen	1st	23 6	25 0	25 0	25 0	24 6	25 0
Australian " .	1st	23 6	23 6	22 6	22 6	24 6	—
New Zealand " .	1st	27 0	25 6	—	31 0	30 6	—
LAMB :—							
British	1st	63 0	62 0	59 6	59 0	64 6	59 0
	2nd	57 0	56 6	55 0	54 0	49 0	46 6
New Zealand .	1st	35 0	38 6	35 0	34 6	44 6	38 0
Australian ...	1st	27 6	28 6	28 0	27 0	32 0	—
Argentine ...	1st	27 0	29 6	28 0	26 0	32 0	28 0
PORK :—							
British	1st	58 6	61 0	61 0	62 0	60 6	56 0
	2nd	54 0	57 0	56 0	56 0	57 6	46 6
Foreign	1st	56 6	—	59 6	59 6	—	—

* Scotch.

AVERAGE PRICES of **British Corn** per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1907, 1908 and 1909.

Weeks ended (<i>in</i> 1909).	WHEAT.						BARLEY.						OATS.					
	1907.		1908.		1909.		1907.		1908.		1909.		1907.		1908.		1909.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Jan. 2	26	0	35	1	32	0	23	11	26	9	26	7	17	3	18	4	17	4
" 9 ..	26	1	35	2	32	9	24	2	26	9	26	11	17	4	18	3	17	5
" 16 ..	26	1	35	5	32	8	24	1	27	1	27	1	17	5	18	5	17	5
" 23 ..	26	2	35	6	33	2	24	5	26	11	27	3	17	5	18	5	17	8
" 30 ..	26	3	35	0	33	0	24	4	26	11	27	6	17	5	18	4	17	9
Feb. 6	26	6	34	3	33	4	24	5	26	9	27	7	17	7	18	3	17	10
" 13	26	7	33	1	33	8	24	1	26	9	27	8	17	7	18	0	17	11
" 20	26	10	32	6	34	1	24	2	26	5	27	11	17	9	17	11	18	0
" 27	26	9	30	11	34	5	24	2	26	3	28	0	17	9	17	8	18	0
Mar. 6	26	8	30	5	34	10	23	11	26	1	27	11	17	11	17	8	18	2
" 13	26	10	31	3	35	8	24	2	26	0	28	4	18	0	17	10	18	2
" 20	26	10	31	7	35	9	24	0	26	2	28	0	18	1	17	11	18	5
" 27	26	8	31	4	36	0	23	9	25	10	28	0	18	2	17	10	18	6
Apl. 3	26	9	31	3	36	5	24	3	25	5	27	10	18	3	17	9	18	8
" 10	26	8	31	2	37	4	23	9	25	13	28	0	18	6	17	7	18	10
" 17	26	8	30	11	38	7	23	3	26	1	27	8	18	7	17	7	19	2
" 24	26	10	30	10	41	4	23	3	25	5	28	2	18	9	17	9	19	9
May 1	27	0	31	6	42	5	23	6	25	8	27	10	19	3	18	0	20	0
" 8	27	6	32	4	40	9	24	0	25	5	27	7	19	7	18	4	20	3
" 15	28	4	33	1	41	6	23	10	24	9	27	3	20	1	18	7	20	6
" 22	29	7	33	8	42	8	24	3	25	9	27	0	20	5	18	10	20	11
" 29	31	4	33	5	42	6	24	0	24	6	26	3	20	8	18	8	21	0
June 5	32	0	33	1	43	1	24	7	25	10	25	7	20	7	18	4	21	3
" 12	31	10	32	7	42	11	24	7	24	5	26	10	20	11	18	4	21	4
" 19	31	4	32	0	42	7	24	11	24	2	26	10	20	9	18	5	21	6
" 26 ..	31	2	31	5	42	8	24	6	24	0	27	2	20	8	18	7	21	7
July 3	31	3	30	11	42	9	24	8	23	11	27	2	20	11	18	7	21	9
" 10	32	0	30	5	43	0	24	10	24	4	26	4	20	11	18	5	21	8
" 17	32	6	30	7	43	3	24	6	23	1	26	10	21	1	18	5	21	9
" 24	32	11	31	5	44	0	27	3	26	5	27	4	20	8	18	6	22	5
" 31	33	2	31	10	43	5	26	4	24	4	24	6	21	2	18	7	22	2
Aug. 7	33	5	31	6	44	9	26	6	23	1	27	4	21	3	18	9	22	11
" 14	33	6	31	6	44	9	25	9	23	10	24	9	20	4	18	1	21	8
" 21	33	7	31	2	41	6	25	0	24	5	23	11	19	8	17	10	19	8
" 28	33	10	30	10	38	5	24	6	24	5	24	7	18	11	17	1	19	4
Sept. 4	31	11	30	10	37	2	24	2	25	5	26	3	17	7	17	3	19	6
" 11	31	4	31	5			24	4	25	11			17	6	17	6		
" 18 ..	31	5	31	7			25	0	26	0			17	6	17	3		
" 25 ...	31	8	31	5			25	3	26	8			17	8	17	2		
Oct. 2 ...	32	6	31	7			25	5	26	11			17	9	17	2		
" 9 ...	33	3	31	5			25	9	27	5			17	11	17	0		
" 16 ...	34	4	31	2			26	3	27	6			18	0	17	0		
" 23 ..	35	9	30	11			27	2	27	5			18	7	16	11		
" 30 ...	36	3	30	8			27	7	27	5			18	10	16	11		
Nov. 6 ...	35	10	30	11			27	8	27	6			18	10	17	0		
" 13	35	1	31	2			27	8	27	4			18	8	17	0		
" 20	34	7	31	10			27	5	27	3			18	9	17	3		
" 27 ..	34	7	32	3			27	5	27	2			18	7	17	5		
Dec. 4 .	34	7	32	7			27	1	27	2			18	6	17	4		
" 11 ..	34	8	32	8			27	0	27	0			18	5	17	4		
" 18 ...	34	9	32	9			27	1	26	9			18	3	17	3		
" 25 ...	34	6	32	2			26	10	26	8			18	0	17	2		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lbs.; Barley, 50 lbs.; Oats, 39 lbs. per Imperial Bushel.

AVERAGE PRICES of Wheat, Barley, and Oats per Imperial Quarter in FRANCE, BELGIUM, and GERMANY, and at PARIS, BERLIN, and Breslau.

		WHEAT.				BARLEY.				OATS.			
		1908.		1909		1908.		1909.		1908.		1909	
		s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
France :	July	37	2	44	1	25	4	28	2	19	8	24	8
	August	37	9	41	6	25	4	27	0	19	9	22	10
Paris :	July	38	6	45	8	26	2	29	8	19	3	26	11
	August	38	4	42	6	26	2	29	2	19	3	24	8
Belgium :	May	35	5	42	5	26	5	26	10	21	3	23	3
	June	34	6	45	5	26	3	25	11	21	5	25	5
Germany :	June	44	8	56	10	26	4	29	11	22	3	27	3
	July	44	9	58	2	26	9	29	9	22	8	28	4
Berlin :	June	45	5	57	5	—	—	—	—	22	7	26	6
	July	47	5	55	10	—	—	—	—	22	5	25	3
Breslau :	June	43	7	57	7	28	6	32	6	20	6	26	3
						(brewing)	(brewing)	(brewing)	(brewing)				
						26	0	26	0				
						(other)	(other)	(other)	(other)				
	July	43	11	58	4	28	6	—	—	20	6	26	7
						(brewing)	(brewing)	(brewing)	(brewing)				
						26	0	26	0				
						(other)	(other)	(other)	(other)				

NOTE.—The prices of grain in France have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*; the Belgian quotations are the official monthly averages published in the *Moniteur Belge*; the German quotations are taken from the *Deutscher Reichsanzeiger*, the prices for the German Empire representing the average of the prices at a number of markets.

AVERAGE PRICES of British Wheat, Barley, and Oats at certain Markets during the Month of August, 1908 and 1909

	WHEAT.		BARLEY.		OATS.	
	1908	1909	1908.	1909.	1908	1909
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
London ..	32 1	42 8	24 5	—	18 8	18 0
Norwich	30 4	44 1	26 1	—	18 3	22 3
Peterborough	30 11	39 5	24 4	—	17 1	22 3
Lincoln...	32 2	44 5	24 4		18 7	21 5
Doncaster	32 3	45 5	—	—	19 1	22 4
Salisbury	31 0	38 10	26 7	22 6	17 9	20 5

AVERAGE PRICES of PROVISIONS, POTATOES, and HAY at certain MARKETS in ENGLAND and SCOTLAND in the Month of August, 1909.

(Compiled from Reports received from the Board's Market Reporters.)

Description	London.		Bristol.		Liverpool.		Glasgow.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d. per 12 lb.	s. d. per 12 lb.	s. d. per 12 lb.	s. d. per 12 lb.	s. d. per 12 lb.	s. d. per 12 lb.	s. d. per 12 lb.	s. d. per 12 lb.
BUTTER :—								
British	13 0	12 0	14 0	12 6	—	—	14 0	—
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery	111 0	107 0	112 0	108 0	108 0	105 0	108 0	—
„ Factory	104 0	100 0	101 0	96 0	98 6	91 6	98 0	—
Danish	115 0	113 0	—	—	117 0	114 0	114 6	—
Russian	103 0	100 0	104 6	99 6	104 0	96 6	101 0	96 0
Australian	—	—	106 0	97 0	—	—	—	—
New Zealand	—	—	—	108 0	—	—	—	—
CHEESE :—								
British—								
Cheddar	71 6 120 lb.	64 0 120 lb.	71 0	62 6	72 0 120 lb.	68 0 120 lb.	64 6	59 6
Cheshire	69 6 per cwt.	60 0 per cwt.	—	—	65 0 per cwt.	60 0 per cwt.	—	—
Canadian	58 0	57 0	58 0	56 0	58 0	56 0	59 0	56 0
BACON :—								
Irish	77 0	74 6	78 6	72 6	78 0	72 0	74 0	72 0
Canadian	68 6	67 0	68 6	67 0	68 6	66 0	68 6	66 6
HAMS :—								
Cumberland	105 6	96 0	—	—	—	—	—	—
Irish	101 0	95 6	—	—	—	—	100 0	92 0
American (long cut)	62 0	59 0	63 6	61 0	64 6	59 0	65 0	63 0
EGGS :—								
British	per 120. 11 0	per 120. 10 2	per 120. 10 2	per 120. 9 4	per 120. —	per 120. —	per 120. —	per 120. —
Irish ...	10 1	9 4	9 8	9 2	10 0	9 0	9 6	8 10
Danish	10 1	8 10	—	—	10 0	9 1	9 9	8 10
POTATOES :—								
per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Sir John	60 0	50 0	60 0	55 0	61 6	55 0	—	—
Llewellyn	61 6	51 6	61 6	55 0	46 6	41 6	—	—
British Queen	61 6	53 6	70 0	60 0	63 6	53 6	—	—
Snowdrop	—	—	—	—	—	—	—	—
HAY :—								
Clover ...	88 6	72 0	78 6	65 0	95 6	71 0	67 0	62 0
Meadow ..	81 6	68 0	72 6	61 0	73 0	55 0	65 0	60 0

DISEASES OF ANIMALS ACTS, 1894 to 1903

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries)

DISEASE	AUGUST.		EIGHT MONTHS ENDED AUGUST	
	1909	1908	1909	1908
Swine-Fever :—				
Outbreaks	106	98	1,249	1,471
Swine Slaughtered as diseased or exposed to infection	807	1,086	10,992	8,500
Anthrax :—				
Outbreaks	79	60	904	758
Animals attacked	110	73	1,211	1,013
Foot-and-Mouth Disease :—				
Outbreaks	—	—	—	3
Animals attacked	—	—	—	112
Glanders (including Farcy) .—				
Outbreaks	33	61	377	566
Animals attacked	79	225	1,370	1,783
Sheep-Scab :—				
Outbreaks	7	4	471	637

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland)

DISEASE	AUGUST		EIGHT MONTHS ENDED AUGUST	
	1909	1908	1909	1908
Swine-Fever :—				
Outbreaks	7	6	82	132
Swine Slaughtered as diseased or exposed to infection	171	166	1,491	2,863
Anthrax :—				
Outbreaks ...	2	1	5	6
Animals attacked	2	1	5	9
Sheep-Scab :				
Outbreaks	—	3	313	274

PERIODICALS FILED IN THE BOARD'S LIBRARY.

THE following is a list of the periodicals, exclusive of annual publications, which are bound and filed in the Board's Library. These volumes may be consulted on application at the office of the Board, 8 Whitehall Place, S.W., between the hours of 10 a.m. and 5 p.m.

United Kingdom—

Analyst.

Agricultural Organisation Society Journal.

„ Record.

„ Student's Gazette.

Beerbohm's Evening Corn Trade List.

Board of Trade Journal.

Brewing Trade Review.

British Bee Journal.

„ Birds.

„ Food Journal.

„ Medical Journal.

Bulletin of the Imperial Institute.

Councils Journal.

County Councils' Association, Official Circular.

Dairy.

Economist.

Education.

Estate Magazine.

Factors Magazine.

Farmer and Stock Breeder

Field.

Gardeners' Chronicle.

Illustrated Poultry Record.

Journal of Agricultural Science.

„ „ the Cooper Research Laboratory.

„ „ the Department of Agriculture, Ireland.

„ „ Economic Biology.

„ „ Horticulture.

„ „ the Incorporated Society for the Destruction of Vermin.

„ „ „ Land Agents' Society.

„ „ „ Liverpool University.

„ „ „ National Poultry Organisation Society.

„ „ „ Royal Horticultural Society.

„ „ „ Royal Society of Arts.

Kew Bulletin.

Lancet.

Land Agents' Record.

Live Stock Journal.

London Gazette.

Mark Lane Express.

Miller.

Monthly Review, Weights and Measures.

Naturalist.

Nature.

North British Agriculturist.

Parasitology.

Quarterly Journal of Forestry.

Science Progress.

Scottish Farmer.

Surveyors' Institution Transactions.

Times.

Trade and Navigation Accounts (monthly).

Transactions of the Royal Scottish Arboricultural Society.

Veterinary Journal.

" Record.

Austria-Hungary—

Land- und Forstwirtschaftliche Unterrichts-Zeitung.

Oesterreichische Monatschrift für Tierheilkunde.

Wiener Landwirtschaftliche Zeitung.

Belgium—

Annales de Gembloux.

" " Médecine Vétérinaire.

Bulletin de l'Administration de l'Agriculture.

" du Ministère de l'Intérieur et de l'Agriculture

" " Service denrées alimentaires.

Laiterie et Elevage.

Revue Générale Agonomique.

" " du Lait.

Denmark—

Tidsskrift for Landbrugets Planteavl.

" " Landkonomi.

Ugeskrift for Landmaend.

France—

Annales de l'Institut National Agonomique.

" " " Pasteur.

" " la Science Agronomique.

Bulletin de l'Institut Pasteur.

" Mensuel, Ministère de l'Agriculture.

" des Séances de la Société Nationale d'Agriculture.

L'Hygiène de la Viande et du Lait.

L'Industrie Laitière.

Journal d'Agriculture Pratique.

Journal de Médecine Vétérinaire et de Zootechnie.

La Laiterie.

Recueil de Médecine Vétérinaire.

Revue des Eaux et Forêts.

" Economique Internationale.

" Générale de Médecine Vétérinaire.

" Vétérinaire.

La Science Agonomique.

Germany —

Annales Mycologici.

Archiv für wissenschaftliche und praktische Tierheilkunde.

Arbeiten der Deutschen Landwirtschafts-Gesellschaft.

" Land- und Forstwirtschaft.

Berliner Tierärztliche Wochenschrift.

Centralblatt für Bakteriologie, Parasitenkunde und Infektionskrankheiten.

Deutsche Landwirtschaftliche Presse.

" Tierärztliche Wochenschrift.

Fühlings Landwirtschaftliche Zeitung.

Jahrbuch der Deutschen Landwirtschafts-Gesellschaft.

Journal für Landwirtschaft.

Landwirtschaftliche Jahrbücher.

Landwirtschaftlichen Versuchsstationen.

Milch-Zeitung.

Mitteilungen der Landwirtschaftlichen Institute, Breslau.

Monatshefte für praktische Tierheilkunde.

Naturwissenschaftliche Zeitschrift für Forst- und Landwirtschaft.

Praktische Blätter für Pflanzenbau und Pflanzenschutz.

Progressus Rei Botanicae.

Vierteljahrshefte für Statistik des Deutschen Reichs.
Zeitschrift der Königlichen Statistischen Bureau.

- „ für Agrarpolitik.
- „ „ das gesamte Getreidewesen.
- „ „ Forst- und Jagdwesen.
- „ „ Pflanzenkrankheiten.
- „ „ Spiritusindustrie.
- „ „ Tiermedizin.

Holland—

Tijdschrift der Nederlandsche Heidemaatschappij.

Italy—

Bollettino del Ministero d'Agricoltura, Industria e Commercio.
„ della Arboricoltura italiana.

Russia—

Annales de l'Institut agronomique de Moscou.
Mémoires de l'Institut agronomique et forestier à Nowa-Alexandria.

Spain—

Boletín de Agricultura Técnica y Económica.

Sweden—

Uppsatser Praktisk Entomologi.

Switzerland—

Landwirtschaftliches Jahrbuch der Schweiz.

Africa—

Agricultural Journal of the Cape of Good Hope
East Africa Quarterly.
Natal Agricultural Journal.
Rhodesian Agricultural Journal.
Transvaal Agricultural Journal.

Australia—

Agricultural Gazette of New South Wales.
„ „ „ Tasmania
Journal of the Department of Agriculture, South Australia
„ „ „ „ „ „ Victoria.
„ „ „ „ „ „ West Australia
Pastoralists' Review.
Queensland Agricultural Journal
Records of the Australian Museum

Canada—

Census and Statistics Monthly
Canadian Forestry Journal
Farmers' Advocate.

United States of America—

American Veterinary Review.
Chicago Veterinary College Bulletin
Crop Reporter.
Experiment Station Record.
Forestry Quarterly.
Journal of Economic Entomology
Philippine Journal of Science.
Reports of the Kansas Board of Agriculture.
Transactions of the Massachusetts Horticultural Society
Treasury Decisions.

India &c.—

Agricultural Bulletin of the Straits and Malay States.
„ Journal of India.
Quarterly Journal of the Department of Agriculture, Bengal.
Tropical Agriculturist.

South America—*Anales de la Sociedad Rural Argentina.**Boletim, Bahia.**Boletim do Ministerio de Agricultura, Argentina.**" " Peru.**Boletim de Agricultura, Sao Paulo.**Journal of the Board of Agriculture, British Guiana.***West Indies—***Bulletin of the Department of Agriculture, Bahamas.**" " " " " Jamaica.**" " " " " Miscellaneous Information, Trinidad.**Journal of the Jamaica Agricultural Society.**West Indian Bulletin.***SELECTED CONTENTS OF PERIODICALS.****Agriculture, General and Miscellaneous—***Store Cattle or Butter, Bacon, and Eggs? J. R. Campbell (Dept. Agr. and Tech. Instr., Ireland Jour., Vol. IX., No. 4.)**Artificial Nitrates. (Jour. Roy. Soc. Arts, 6 Aug., 1909)**Der Fruchtfolgeversuch in Rosenthal: Ein experimenteller Beitrag zur modernen Statik des Landbaues. I. Bericht, 1909, K. von Rumker, O. Bormann, C. Bloch, P. Ehrenberg, R. Leidner (Mitt. Landw. Inst. Breslau, Vol. 5, No. IV.)**Zur Methode der Keimprüfung, II. Pieper. Referate über neue Arbeiten auf dem Gebiete der Pflanzenzüchtung, C. Fruwirth. (Jour. Landw., Vol. 57, No. 3.)**Landwirtschaft im Königreich Sachsen, Dr. Raubold. (Jahrb. Deut. Landw. Gesell., Vol. 24, No. 2)**Kalkstickstoff als Hederich-Vertilgungsmittel, Heinrichsen. (Prakt. Bl. Pflanzenbau u. Schutz, Vol. VII., No. 8.)**Das Gesetz des Minimums und das Gesetz des abnehmenden Bodenertrages, E. A. Mitscherlich. (Landw. Jahrb., Vol. XXXVIII., No. 4.)**Die Stellung und Bedeutung des Theorie im landwirtschaftlichen Maschinenbau, G. Fischer. Über die tatsächliche Bedeutung des Gesetzes des abnehmenden Bodenertrages, L. Wittmack. (Landw. Jahrb., Vol. XXXVIII., Suppl. V.)***Field Crops—***Die Kardenbau in Niederbayern, Heinrichsen. (Prakt. Bl. Pflanzenbau u. Schutz, Vol. VII., No. 8.)**Über das Bleichen der Mehle, J. Buchwald and M. P. Neumann. Die Stammpflanze unserer Kartoffel, L. Wittmack. (Landw. Jahrb., Vol. XXXVIII., Suppl. V.)***Horticulture—***Obstbau im Königreich Sachsen, Tamms. (Jahrb. Deut. Landw. Gesell., Vol. 24, No. 2.)***Plant Diseases—***The Dry-Rot of Potatoes, Sibyl Longman. (Jour. Linn. Soc., Bot., Vol. XXXIX., No. 270.)**Die Miniergänge von *Lyonetia clerkella* und die Stoffwanderung in Apfelblättern, O. Schneider-Orelli. (Centbl. Bakt. [etc.], Vol. 24, No. 5-7.)**Ein neues Mittel gegen den Amerikanischen Stachelbeermehltau? L. Hiltner. (Prakt. Bl. Pflanzenbau u. Schutz, Vol. VII., No. 8.)***Live Stock—***Winter and Summer Calf-Rearing: Experiments—Report i., J. M. Adams; Report ii., W. F. Prndergast. The Meat Supply of the United Kingdom. (Dept. Agr. and Tech. Instr. Ireland Jour., Vol. IX., No. 4.)*

Dairying—

Winter Milk Production : Experiments—Report i., *J. M. Adams*; Report ii., *W. F. Prendergast*. (Dept. Agr. and Tech. Instr. Ireland Jour., Vol. IX., No. 4.)

Birds, Poultry and Bees—

Winter Egg Records. (Dept. Agr. and Tech. Instr. Ireland Jour., Vol. IX., No. 4.)

Studien über den Stoffwechsel des Haushuhnes : Fütterungsversuche mit Kartoffeln, Roggen und Hafer, *W. Völtz*. (Landw. Jahr., Vol. XXXIII., No. 4.)

Forestry—

Protection of Woodlands in Ireland, *A. C. Forbes*. (Dept. Agr. and Tech. Instr. Ireland Jour., Vol. IX., No. 4.)

ADDITIONS TO THE LIBRARY.

[NOTE.—The receipt of *annual* publications of foreign agricultural and other departments, experiment stations and societies is not noted in the monthly list of additions to the Library.]

Agriculture, General and Miscellaneous—

Lipman, J. G.—Bacteria in relation to Country Life. (486 pp.) New York : Macmillan, 1908. 6s. 6d. net.

Smith, F. Carrington.—Story of a Staffordshire Farm. (42 pp.) Stafford : J. and C. Mort, Ltd., 1909. 1s.

Fraenckel, M.—Sveriges Jordbruk vid 1900 Talets Borgan : Statistiskt Kartverk.* (262 pp. in addition to the maps.)

Victoria, Dept. of Agric.—Recording Census of Victorian Flora. (98 pp.) 1908.

Royal Commission on Whiskey and other Potable Spirits.—Final Report [C'd. 4796]. (47 pp.) London : Wyman & Sons, 1909. 5½d.

Burrard, S. G., and Hayden, H. H.—A Sketch of the Geography and Geology of the Himalaya Mountains and Tibet. Part IV. : The Geology of the Himalaya. (207–308 pp., with plates xxxiii. to xlix., and geological map.) Calcutta : Government Printing Office, 1908.

André, G.—Chimie Agricole. Chimie Végétale. (560 pp.) Paris : Baillière et Fils, 1909. 5fr.

U.S. Dept. of Agric., Bureau of Plant Industry.—Circ. 34 :—The Work of the San Antonio Experiment Farm in 1908. (17 pp.) Washington, 1909.

Avbury, The Rt. Hon. Lord.—Flowers, Fruits and Leaves. (147 pp.) London : Macmillan and Co., 1903. 4s. 6d.

Field Crops—

Department of Agriculture in India.—Memoirs. Botanical Series, Vol. II., No. 6 :—Some Experiments in the Hybridising of Indian Cottons. (28 pp.+9 plates.) Botanical Series, Vol. II., No. 7 :—The Varietal Characters of Indian Wheats. (66 pp.) Pusa, 1908.

Horticulture—

Weathers, J.—French Market-Gardening. (227 pp.) London : John Murray, 1909. 3s. 6d. net.

Lustner, G., and Molz, E.—Schutz der Weinrebe gegen Frühjahrfröste. (121 pp.) Stuttgart : Eugen Ulmer, 1909.

Durham, H. E.—Studies on Cider and Perry. No. I. :—Sulphite Preservatives. [Reprinted from The Journal of Hygiene, Vol. IX., No. I., pp. 17–32.]

Smith, Thos.—French Gardening. (128 pp.) London : Joseph Fols, 1909.

[Books may be borrowed from the Board's Library on certain conditions, which may be ascertained on application. Books marked * are not lent.]

THE JOURNAL

OF THE

BOARD OF AGRICULTURE

Vol. XVI. No. 7.

OCTOBER, 1909.

AGRICULTURAL EDUCATION IN ENGLAND AND WALES.

THE following memorandum of arrangements between the Board of Agriculture and Fisheries and the Board of Education in regard to Agricultural Education in England and Wales has been presented to both Houses of Parliament (Cd. 4886, Price 1*d.*).

After careful consideration of the many matters and interests involved in the promotion of Agricultural Education, we have decided upon making the various arrangements set out in the following paragraphs as regards the work of the two Boards. Our object has been to provide suitable means for focussing the special needs of Agriculture in relation to Education and to secure the practical consideration of the particular problems of this branch of education, and effective cooperation in relation to all educational work carried on for rural areas. These arrangements aim in particular at the improvement and extension of specialised instruction of all grades bearing on agriculture and the maintenance of a close relationship between such instruction and the practice and progress of the various branches of the industry.

1. We propose to constitute a Rural Education Conference for the discussion of all questions connected with education in rural districts and for the periodical exchange of views between representative agriculturists and the two Departments. This Conference, which will be constituted by a later minute to be issued in the course of the Autumn, will consist

of members nominated by the County Councils Association, the Agricultural Education Association, the Royal Agricultural Society of England and other leading agricultural organisations, together with six additional members to be nominated by the Presidents of the two Boards so as to provide for the inclusion (a) of persons specially competent to deal with educational questions so far as the rural districts are concerned, and (b) of representatives of districts not adequately covered by existing agricultural organisations. The Conference will be attended also by such Officers of the two Boards as may be nominated by their respective Presidents to take part in its deliberations and to supply information or to give explanations with regard to any questions that may be raised.

2. In order to avoid overlapping or duplication of work in the sphere of Agricultural Education between the Board of Agriculture and the Board of Education, and at the same time to secure that every portion of the field is as largely aided and developed as possible, by the combined and separate efforts of the two Boards, it has been arranged that in future all Parliamentary Grants in respect of Agricultural Education shall be distributed, in the case of Institutions giving instruction to students taking Advanced Courses in Agriculture or in some special branch thereof as further defined below, by the Board of Agriculture, and as regards other forms of Agricultural Education by the Board of Education. But this distribution will be carried out by both Boards under conditions which will secure that the various sections of work thus aided are in due relation to one another. And, in order to facilitate this, an Inter-Departmental Committee consisting of responsible Officers of the two Boards will be constituted, to consider and report to the Boards on all questions which may arise either as to the correlation of the duties of the two Boards or as to the grants to be made in cases in which they are mutually interested. This Committee will meet from time to time as may be required. Officers of either Board, other than those appointed as members of the Committee, may assist the Committee from time to time as the Committee or either Board may think desirable.

3. The sphere of work thus falling to the Board of Agri-

culture and Fisheries will comprise institutions of two types:—

- (a) Those whose predominant purpose and work it is to provide comprehensive courses of Agricultural Instruction of an advanced nature, of which the proper benefits can only be received by students who, on admission, have received a satisfactory general education, whole-time, up to the age of 17 (or thereabouts), or later, or who have otherwise obtained a preliminary education of a similar standard. Each such institution should serve more, usually considerably more, than one Local Education Authority's area.
- (b) Institutions restricted to one special section of Agricultural Instruction (e.g., Forestry, Dairying, Cider-making), the main purpose of which is to provide a course of specialised teaching in that subject on such a plane as will equip those who pass satisfactorily through it to be competent Instructors in that section of Agricultural work in Agricultural Institutions or as local Instructors in all parts of the country.

Government Grants will thus be paid by the Board of Agriculture and Fisheries in respect of their agricultural work to the following Institutions, and to such others as may in future be found to be of a similar character or on the same educational plane:—

University College of North Wales, Bangor.
 University of Leeds.
 Armstrong College, Newcastle-on-Tyne.
 University College of Wales, Aberystwyth.
 University of Cambridge.
 University College, Reading.
 Royal Agricultural College, Cirencester.
 South-Eastern Agricultural College, Wye.
 Midland Agricultural and Dairy College.
 Harper Adams Agricultural College.
 College of Agriculture and Horticulture, Holmes Chapel.
 Harris Institute, Preston.
 Royal Veterinary College.
 British Dairy Institute, Reading.
 Royal Horticultural Society's Garden School, Wisley.
 Horticultural College, Swanley.
 National Fruit and Cider Institute.

4. While the special functions of the Board of Agriculture will, as above shown, be to deal with and to influence the Agricultural Colleges and other independent Institutions named in the foregoing list, the relations of the Board of Education will, in the main, be with the County and other Local Authorities and such other Bodies as are supplying part of the local system of provision of Public, including Agricultural, Instruction. And it will be the business of the Inspectors of the Board of Education to represent to the County and other Local Authorities the need for continuous development of special provision for Agricultural Education, and to draw attention to the various types and grades of work thus required, particularly as regards the need for a largely increased provision of Farm Schools. The Inter-Departmental Committee with the views of the Rural Education Conference before them will give to the Board of Education all the advice and information they can as to types of School, methods of instruction and lines of organisation of instructional staff, most needing to be encouraged in particular parts of the country.

5. There is, at the same time, an important matter in connection with some of the cases comprised in the foregoing paragraph for which some special arrangement seems desirable: viz., the provision and efficient maintenance of Farms and Experimental Stations in connection with Farm Schools and such other similar places of Agricultural Instruction as fall within Section 4 above. These Farms and Stations are greatly needed if the educational work of institutions of this type is to be carried on with full efficiency; and, as it is in the highest degree desirable that such forms of practical work should be kept in close touch with the latest and best developments in practical agriculture, it is believed that such Government supervision and aid as is made to them should be from the Board of Agriculture. It has, therefore, been arranged that such Parliamentary Grants as may be, or become, available for the establishment and maintenance of the Farms and Stations, and of any experiments or investigations carried on in connection therewith, shall be distributed by the Board of Agriculture: the Grant in respect of the Educational work of the Farm Schools being made by the Board of Education, and all necessary arrangements for maintaining due relation

between the two functions of the Schools and Stations, and for making the corresponding grants, being determined by the two Boards on the report of the Inter-Departmental Committee above described.

6. We believe that the adoption of the foregoing arrangements will be welcomed by all those who are concerned with the development and extension of existing arrangements for the supply of all grades of education and specialised agricultural instruction in the rural districts. They will afford opportunities for bringing leading and representative agriculturists into touch with the Officers of the two Departments and for bringing those Officers themselves into closer and more continuous relationship one with the other. It cannot be doubted that much still remains to be done in order to bring the facilities for agricultural education at the disposal of British agriculturists to the level of those enjoyed by many of their competitors elsewhere, and we trust that important advance in this direction may result from the working of the arrangements here described.

(Signed) CARRINGTON,
*President of the Board of Agriculture
and Fisheries.*

(Signed) WALTER RUNCIMAN,
President of the Board of Education.

22nd September, 1909.

THE CONSTRUCTION OF COW HOUSES.

JOHN SPEIR, Kt.StO.

THE requirements of modern life demand a degree of purity in our food supplies little dreamt of in previous generations. Milk is no exception to the general rule, and in order to obtain pure milk it must be produced by healthy cows in healthy surroundings.

In the construction of houses for the accommodation of cows intended to produce milk, either for consumption as it comes from the cow, or to be made into cheese or butter, the main requirements to be kept in view are the following :—

(1) The milk produced should run little risk of being contaminated either by dirt or disease.

(2) The animals should enjoy the best of health, and be free from risk of infection of any kind.

(3) The design of the buildings should be such that the labour of feeding and cleaning the cows should be reduced to the minimum, while the comfort of the animals should be the greatest which it is possible to give.

(4) The outlay should be such as will add as little as possible to the cost of production of the milk.

While it is comparatively easy, where the requisite skill is available, to provide new buildings which will meet all the above requirements at even a very moderate cost, it is much more difficult to alter an existing building so that it can be made as suitable for the purpose as a new one. That should not, however, deter owners and occupiers from making alterations on the lines suggested, as under suitable guidance even the most unsatisfactory buildings could often be much improved at moderate cost.

In designing a cow house, the principal details which should receive consideration are the following :—

Site, including aspect and arrangement with regard to other buildings.

General construction of the building, including the walls, roof, floor, drainage, and water supply.

Internal Design, including arrangement of stalls, stall divisions, bindings, feeding troughs, manure and urine channels, passages, &c.

Air-Space, including floor space.

Ventilation, including the various methods by which this is attained; and *Lighting*.

The Site.—Where there is the opportunity of selection, the site should be moderately high and dry, convenient for the supply of fodder and roots, the preparation and storage of feeding stuffs, the removal of the manure and urine, and should give easy and ample access to the nearest pasture without interference with other stock, and without affording the cattle an opportunity to stray into other parts of the farm buildings, &c. In the designing of a completely new set of farm buildings these can usually be all provided without any great difficulty. It is when a new cow house is being added

to existing buildings, and more especially when no part of these has previously been utilised for dairy purposes, that the greatest difficulties occur. In such circumstances, it is seldom possible to get all the details worked out as completely as can be done where everything is new, but with care and skill there should be no real difficulty in effecting considerable improvement on the average building of the present day.

While shelter from heavy winds is desirable, no cow house should have any buildings, such as hay or straw sheds, or buildings occupied by other kinds of stock, erected against the side walls. If the building is one such as an open fronted shelter for implements, little objection can be urged against it, but anything which would interfere with the proper ventilation of the cow house should be placed somewhere else. Land is not so very costly round the average farm that there is any excuse for crowding buildings together, as is not infrequently the case.

Walls.—The walls may be of any material which is plentiful and cheap in the district, and with suitable precautions equally good buildings may be erected of stone, brick, concrete, wood, or wood and iron. If of stone or brick, all outside walls should be neatly pointed, and inside ones plastered, or faced with bricks, either enamelled on the one side, or hard pressed. Where plastering is adopted, cement should be used for a height of six feet from the floor. Above that the surface should be smooth, and of such a nature that it can be either washed or lime-washed. If the building is to be of wood, or wood and iron, all uprights and sills should be of creosoted timber. The extra expense will not be great, while the life of the building will at least be doubled.

Roof.—While any kind of roofing material may be adopted, with more or less advantage in particular districts, a wooden roof covered with slates or tiles should be given the preference. No matter what is the material used or what is the design of the building, in every case in this country it should be open to the ridge. Other countries with more severe climates than ours may tolerate lofts and barns above, but here nothing of the kind should be permitted. The extra cost of planing the inside surface of all parts of the roof is

very trifling, and from various points of view the planing is of considerable advantage.

Floor.—The first point which should be considered in connection with the floor is its level compared with the existing roadway, or completed surface round the building. In the majority of cases, but more particularly on level land, or where there is a difficulty in getting sufficient fall for the drains, the floors are laid at too low a level. This is a serious mistake, which there are few opportunities of correcting, and one which is very common in old buildings. The consequence is that the floor and stalls are often damp, and the roadway outside is invariably covered with mud and slush. In not a few instances the roadway outside is difficult to improve, as it cannot be raised, owing to the risk of running the surface water into the building, instead of away from it. These difficulties should, therefore, be guarded against by fixing the floor at a comparatively high level rather than a low one.

The main flooring materials should be either cement concrete, or blue bricks. Both have some faults, each in a direction different from the other. A perfect material for cow-house floors has yet to be introduced, but with all its faults, good cement concrete, properly laid and finished, is probably the best for general purposes, where clean sharp sand and gravel are available. If suitable sand is not easily obtained, and hard blue bricks can be had at a moderate cost, they may be used in preference to cement concrete. In putting down the floor, either for cement concrete or bricks, the bottom should be laid with stones 6 to 8 inches deep. These should be sufficiently large to fill up the whole depth in one layer, each stone being separately placed in position by hand. A layer of ordinary concrete 3 to 4 inches thick should be placed on the top and well beaten down among the bottoming by hand beaters. Before the concrete has set, it should be covered with one inch or so of two parts of crushed granite and one part of cement. Instead of being floated or smoothed on the surface this should be left rough, as when smooth it is always slippery, unless when well washed. It is generally recommended that the passages and hind part of the stalls should be V-grooved, but this has little effect in

preventing slipping where the passages are not kept thoroughly clean, while the wheels of coolers, or other carriages used in the conveyance of food to the stock, invariably break the surface at the grooves. Properly finished concrete is scarcely ever slippery if clean, but may be more or less so if dirty. It is fully as cheap as any other flooring material laid equally substantially, is less absorbent than most, and probably more durable than any other. Where blue brick is used for the passages and stalls cement might with advantage be put in the bottom of the manure channel, as there are no junctions as with bricks to hold urine and manure, and the uniform gradient necessary for this part is more easily maintained with cement than with bricks.

Drainage.—There is general agreement among those who know this subject best that there should be no covered drains inside the cow-house, or if there are, they should be reduced to the shortest length possible. With buildings having two rows of stalls, particularly those of the largest size, it is not always convenient to have open drains, as occasionally the fall is to the centre, and in that case a covered drain has often to be made from the manure channel to the outside. In such circumstances no one need hesitate in putting in a covered drain, rather than have an open one in an awkward position, where the risks from the open drain may be much greater than from the closed one. In such circumstances no pipe should be put in less than six inches in diameter, and pipes eight or nine inches are to be preferred. The pipes should be given a steep gradient, say, one inch or more for each three feet length of pipe. There should be no bends in the line of piping, which outside the building should end in a small cess-pool. The entrance at the manure gutter should be protected by a grating, and any good pattern of sludge collector.

The drainage outside the cow-house will, in great part, depend on how the urine is to be disposed of. Urine drains are always difficult to keep clear, and in consequence they should be given a good fall and kept as short as possible. If there are any bends, pipes with loose covers should be inserted at each, and if the length is great or fall little pipes with loose covers should be inserted at frequent intervals.

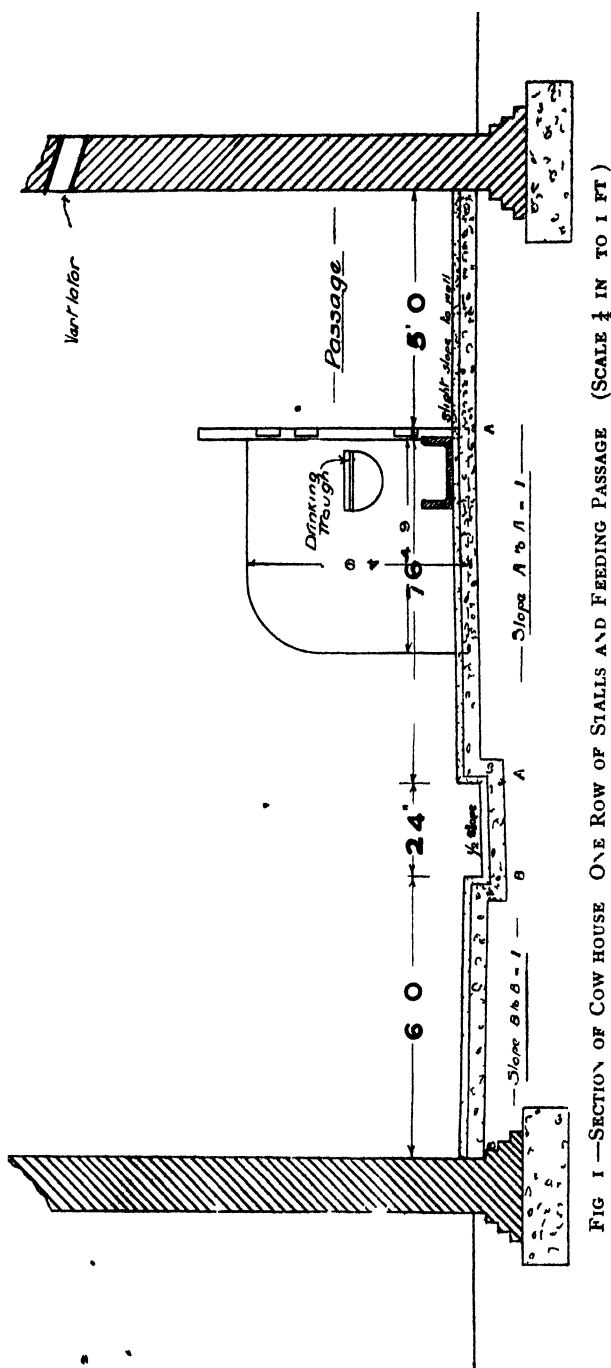


FIG 1.—SECTION OF COW HOUSE ONE ROW OF STALLS AND FEEDING PASSAGE (SCALE $\frac{1}{4}$ IN TO 1 FT)

A good method for utilising the urine is to have a tank close to the dungstead into which all leakage from it should run, and into which the drain from the cow-house should discharge. A urine tank in such a position permits of the contents being distributed over the top of the manure heap, when there is not a suitable piece of land to apply it to. One of the most economical methods of utilising urine is to spread it on permanent hay meadows. If so utilised it may be carted on, but better results will be obtained and less labour will be required if the urine can be diluted with water, and spread over the land by small irrigation channels.

Water Supply.—The best supply is by gravitation from some perennial spring at a higher level, after which come supplies from streams, lakes or ponds. In many cases springs and rivers at a lower level can be utilised, and part of their contents conveyed to the farm by a ram or windmill. These sources are only available for a limited area of the country, and in the majority of cases the average farm has to depend on well water. In such circumstances a sufficient supply should be provided in storage tanks at such a height as will permit of it being distributed to the cow-house and milk-cooler.

Internal Designs.—The utility of every building will in great part depend far more on the design adopted than on the materials used in the construction of it. Expensive materials may be used in the construction of a cow-house, yet owing to the imperfection of the design very unsatisfactory results may be obtained. On the other hand, very plain materials, if worked up into a good design, may give very satisfactory results. While excellence in materials should always be aimed at, much more will depend on the design than the materials.

The method of stalling the animals adopted in Fig. 1 is one of the oldest, and at the same time one of the most approved, more particularly where existing farm buildings are being utilised for cow-houses. Many ordinary farm buildings are from 18 to 20 feet wide, and where it is desired to transform them into a cow-house this can usually be accomplished at a very moderate expense. Where, however, a new building is being erected, it will be more economical

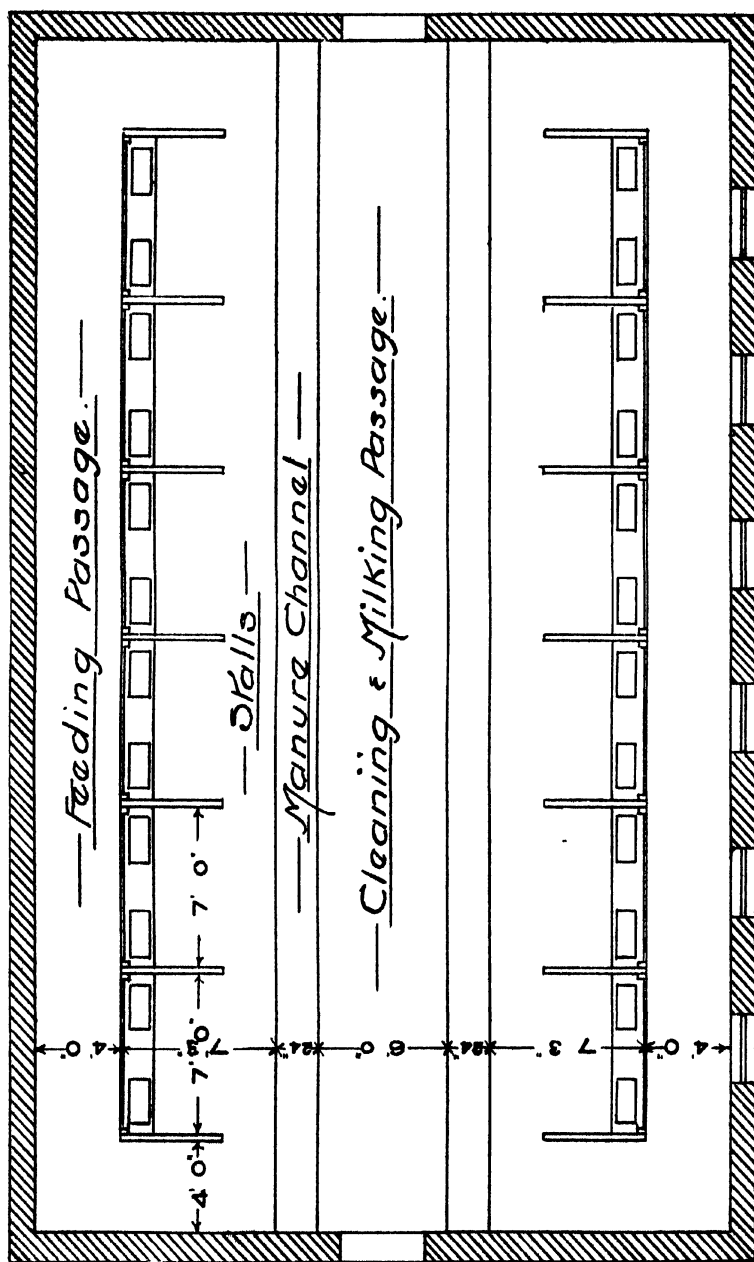
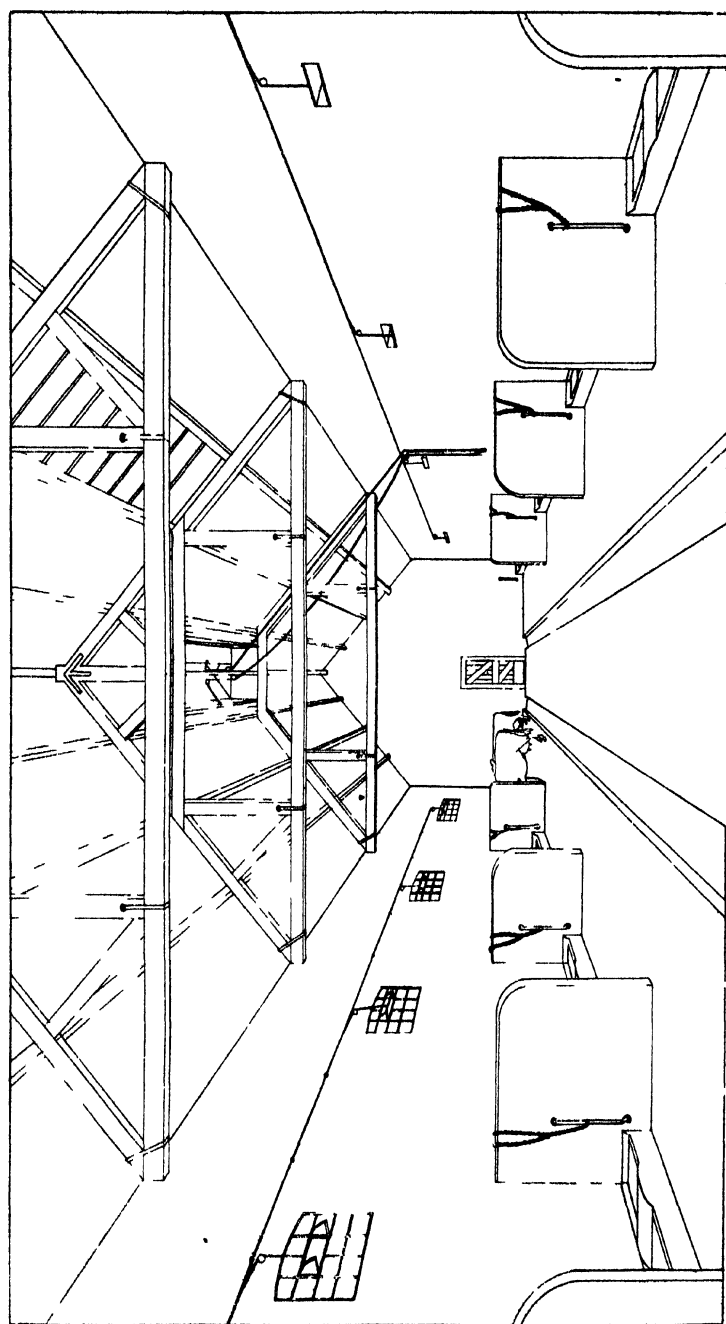


FIG. 2.—GROUND PLAN OF COW-HOUSE: TWO ROWS OF STALLS AND FEEDING PASSAGES. (SCALE $\frac{1}{4}$ IN. TO 1 FT.).

to adopt design No. 2, where the same principle is followed as in No. 1, except that two rows of cows are provided for, instead of one.

This arrangement has a great deal to recommend it from various points of view, and although the initial cost is fairly high, the advantages obtained warrant the extra expense. In building a new cow-house, unless for a very small number of cows, the two-row design will in nearly every case be adopted, as the cost per cow is somewhat less than in the single one. The extra cost for a cow-house on this plan is not so great as would appear at first sight. It is desirable to provide a certain cubic or floor space for each animal, and the cost of the extra passage is saved in the walls, which do not require to be made the same height as in a building without any passage at the heads of the cattle.

In many of the dairying districts a passage between the heads of the cows and the wall is considered unnecessary and undesirable, because (1) any saving in labour that is effected by feeding the cows from a passage at their heads compared with one from behind is only trifling, and is more than discounted by the extra labour necessary to keep that passage clean; and (2) when animals have been lying for a time they very often pass some excrement as soon as they rise. Where there is a feeding passage at their heads the cows usually rise when feeding begins, and in their anxiety to be fed they generally press toward the passage, and if the fittings permit of it, they often thrust their heads over the division. Any excrement dropped at this time, as is often the case, falls on the floor of the stall, instead of in the manure channel. If this is not cleared away soon after, the cow may lie down on it later on, and soil not only her hind-quarters, but also her udder and teats. With a bullock intended to be slaughtered this would be thought little of, as it is not in any way likely to affect the quality of the flesh of the carcase. It is, however, quite the reverse with a cow giving milk, as clean milk can never be obtained from a dirty cow, much less from one with her udder or teats soiled with her own excrement. Milk produced under such conditions is disgusting. Where the division in front of the cows, however, is made high enough to prevent them putting their



INTERIOR OF COW-HOUSE.

FIG. 3.

heads over the top of it, there is no greater liability of the stall being soiled than if the animals were tied up with their heads to the wall.

Cleanliness of the udder and teats or the hands of the milker is a comparative term, and will be variously interpreted by different people. At the International Congress on Dairying at Buda-Pest in 1909 Dr. Paul Schuppli gave the following definition:—"The udder (and particularly the teats) should be so clean that no one would shrink from touching them with lips or tongue." This is one of the best definitions of cleanliness of the udder and teats that has yet been given, and the more it is considered the greater will be found the necessity for its general application.

In addition, milk once polluted can never be made clean, as sieving and pasteurising only cover up the pollution by removing what is objectionable to the sight, but, after all, the pollution remains very much the same as before.

In many parts of the country the most common type of cow-house is that represented in Fig. 3, in which the cows are stalled with their heads to one of the outside walls. In these cases the one central passage serves the purpose of conveying the food to the cows, removing the manure, and taking away the milk. Like plans No. 1 and No. 2, this one may be either single or double, the latter being the cheapest building that can be erected. It does not, however, give the same opportunity for supplying the stock with fresh unpolluted air that designs No. 1 and No. 2 do, as the air at the head of the stalls is always more polluted than in any other part of the building, whereas it is there that pure air is of most advantage.

There is a type of cow-house which is very common in many districts of Britain, but which is objectionable in various respects. In it all the stock are fed from one central passage, while the manure and the milk are removed by the two at the sides. In this case the cows' heads are as far removed from the fresh air inlets as they possibly can be, while the animals breathe into each other's faces from opposite sides of the passage. In a building of this class, where not exceptionally well ventilated, the general health of the stock is likely to be low, and one infected animal in the lot may cause a great

amount of damage. It is also defective, in that the passages from which the milking is carried on are usually too narrow to secure milk standing on them from risk of pollution, as where the passages are under 5 ft. or 6 ft. wide, the walls behind the cows are often spattered with dung.

Passages.—The majority of cow-houses usually have the passages much too narrow. A feeding passage cannot be worked in with comfort if the breadth is less than 4 feet, and it will be all the better if made slightly more. Milking passages, no matter whether in single or double buildings, should not be less than 5 feet wide for single cow-houses and 6 to 7 feet for double ones. This width is not necessary, either for feeding or cleaning, but on most farms, particularly the larger ones, nothing less should be allowed for a milking passage. It is only on the very smallest of farms that each milker carries the milk direct from the cow to the dairy or cooler. The common practice is to have special cans for carrying the milk, and during the operation of milking these are left in the passage or walk, and as each cow is finished the milk is emptied into these cans. When full, they are carried to the dairy or refrigerator and emptied, after which they are returned to their place in the passage. With a double cow-house where the passage is less than 6 feet wide there is always a risk, while they remain there, of a cow near at hand passing either urine or dung, and part of these not only getting splashed on the can, but also into it. The narrower the milking passages are, the greater is the risk of this source of pollution, which, although always present, is more pronounced during the season when pasture is young and succulent. Single cow-houses with 24-inch manure channels and 5-ft. passages behind the cows become spattered with dung even during the winter months, so that it is quite evident that cans of milk standing in the passage run more risk of pollution than most people care to admit.

Stalls.—The stalls of cow-houses only require a very trifling incline from the trough to the manure channel. Each spring when the cows go out to the pasture the stalls should be thoroughly scraped, and all filth removed. This necessitates soaking the stall with water, and, when the dirt has been removed, thoroughly washing it out, and unless the stall is

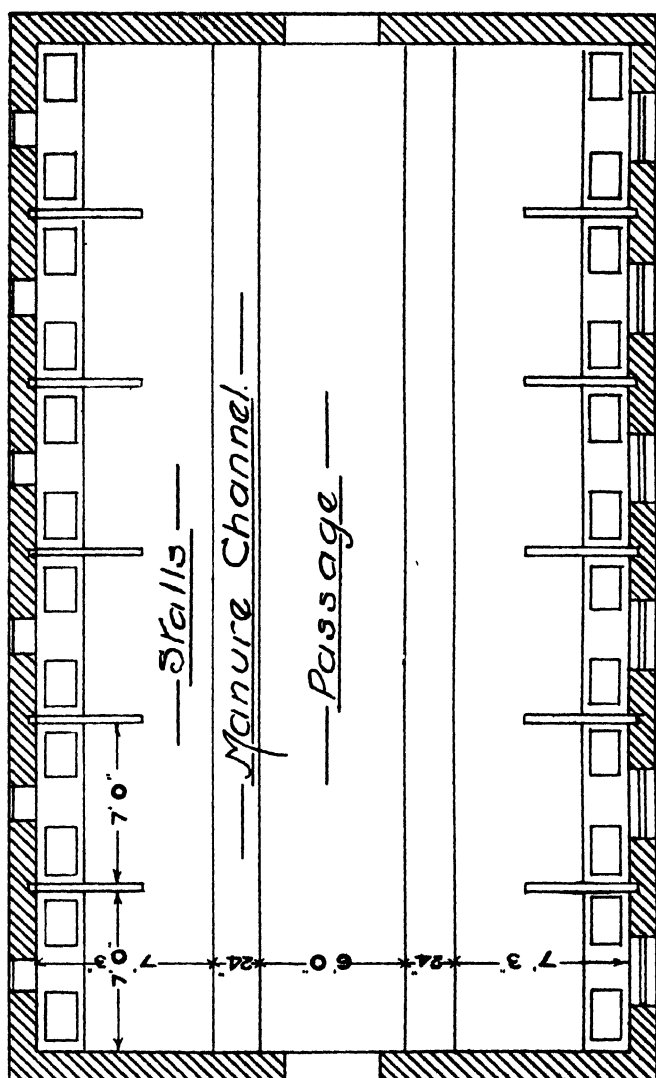


FIG. 3A.—GROUND PLAN OF COW-HOUSE SHOWN IN FIG. 3: TWO ROWS OF STALLS, WITHOUT FEEDING PASSAGE. (SCALE $\frac{1}{4}$ IN. TO 1 FT.).

given a fall of from one to two inches, it is difficult to get the floor dried.

Each stall should be proportionate in length to the class of cow that is expected to occupy it. For the smallest size of cows, such as Jerseys, Kerrys, and young Ayrshires, the stall measured from the wall or division between the cows and the passage to the manure channel should be from 6 ft. 9 in. to 7 ft. long, inclusive of the breadth of the trough. For Ayrshires, a stall of 7 ft. to 7 ft. 3 ins. is quite sufficient, while Shorthorns require from 7 ft. 3 ins. to 7 ft. 6 ins., and exceptionally large cows 3 ins. more. If the stalls are too short for the cows they will stand in the manure channel, and sooner or later the feet become soft and diseased. If the stalls are too long for the stock they drop their dung on the floor, and later on when they lie down they are almost sure to soil their hindquarters or udder with it. Where this state of matters exists the extra labour necessary to keep the stalls, and cows, reasonably clean is very great, and out of all proportion to what is necessary to reduce the stall to the proper length.

For the smaller size of cows, each double stall should be from 6 ft. to 6½ ft. in width, and for the larger ones, from 6½ ft. to 7½ ft. wide. If the stalls are too narrow the cows tread on each other's legs, udder, and teats, and in the latter two cases injury to these almost invariably means loss of a quarter. If the stalls are too wide, the cows turn round in them, and drop urine or excrement in the trough, or on the floor of the stall. While the back part of the stall may be of cement concrete, blue brick or stone, the front part should be of brick or hard asphalt only.

Stall Divisions.—The stall divisions may be of cement concrete, stone, wood, or iron, or in the event of stanchions being used, they may be done without altogether. Coloured or uncoloured cement 3 ins. thick is, however, one of the strongest, neatest, and most serviceable divisions yet introduced, as it is almost everlasting, and saves painting, periodic washing with water or lime washing being all that is required to keep it clean and bright. The stall divisions should not be less than 4½ ft. long, and 4 ft. to 4 ft. 3 in. high. With the swinging stanchions used in Canada and the States, the

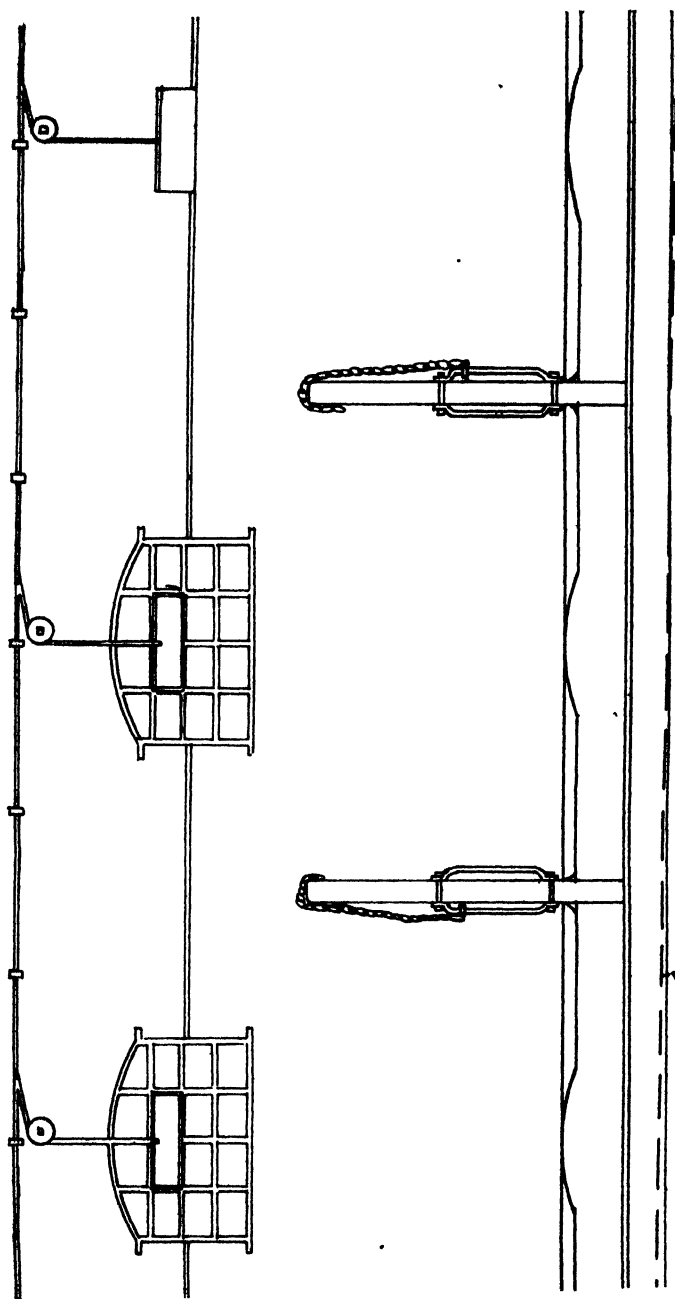


FIG. 3B.—SECTION OF STALLS OF COW-HOUSE SHOWN IN FIG. 3. DOTTED LINE SHOWS FALL IN MANURE CHANNEL (1 IN. IN 7 FT.).

cows can be much more quickly tied up than with our method of chains and hooks, while the attendant runs less risk of being hurt by the horns of the animals while so engaged.

Troughs.—Each cow should have a separate feeding trough of thoroughly glazed fireclay, as separate troughs for each animal are much to be preferred to continuous ones. It is a mistake to put in very large troughs, those 20 by 16 by 8 ins. being quite large enough for most purposes. Each double stall should have the space between the two troughs filled up with brick. This keeps each trough sufficiently far away from the neighbouring animal that it cannot steal any food. All the corners along the back and ends of the troughs should be filled up with cement to as long a slope as possible, so as to prevent unconsumed food, bits of straw, and filth of any kind from lodging there, and, when putrefaction begins, setting up bad smells.

Where it is desired to provide facilities for supplying the stock with water when in the house, one of the best of many methods is to have small circular troughs 9 ins. or so in diameter, set in a recess cut out of the stall division close to the wall or division, and 1 ft. or so above the trough. These troughs should have a lid which is hinged at the back and projects over the edge $\frac{1}{2}$ in. or so, and it should be so arranged that it cannot be lifted up to a perpendicular position. All stock seem to learn to lift the lid with their nose in a few days, and as soon as they have satisfied their thirst, the lid falls and keeps out dust, straw, &c. The level of the water in the troughs may be regulated either by a ball cock, or, if water be plentiful, it may pass off by an overflow at any or all of the troughs. If there is a feeding passage, the overflow may pass away by an open shallow gutter in the floor along the side nearest the troughs.

Manure Channel.—Probably no part of the average cow-house is constructed in so faulty a manner as the manure channel. In no case should it be less than 24 ins. wide, and for large sized cows it may with advantage be increased to 27 or 28 ins. It should not be less, and need not be greater than 6 ins. deep at the cow's heels, and at the side next the passage 4 ins. will be quite enough. A fall lengthwise in the floor of the channel of $\frac{1}{4}$ in. for each cow is quite

sufficient. These in themselves are trifling details, but they are items of immense importance in connection with the cleanliness of the animals, and indirectly with the purity of the milk. The reason for making the manure channel as suggested above is that when the cattle have been in the house for a few hours, the manure which they make is so great that if the channel is any narrower than suggested it becomes blocked with manure from side to side. In the interval more or less urine is constantly being passed by all the animals, and instead of getting an outlet to the cistern, it remains dammed for the time being between each heap of manure. Under these conditions every time a cow lies down there is a liability of her tail dropping into the pool of urine, which later on she switches over her own body and that of her neighbours. This mixture of urine and thin dung is soon dried by the heat of the bodies of the animals, and during the act of milking part of it becomes detached in the form of dust, and drops into the milk. Cows so stalled can only be kept reasonably clean by the expenditure of an excessive amount of labour on the part of the attendant, and no matter what amount of care is exercised during the process of milking, the milk itself is sure to suffer.

Before a cow-house can be considered efficient in regard to the cleanliness of the animals, or the purity of the milk, it must be provided with a manure channel having a minimum width of 24 ins., and constructed as suggested. People who have not had experience of a wide manure channel fancy that the cows will have difficulty in stepping across it. Such is not the case, as they seldom make any attempt to step across it. They simply seem to ignore it, as owing to its shallowness they step into it, as if it were not there. Even although every known precaution is taken, extraneous matter will at times enter the milk, but if the manure channel is badly designed, or if the work is indifferently executed, it will be found almost impossible to produce milk even approximately pure.

Floor Space.—While some of the details in connection with the construction of cow-houses have in the past received more consideration than their importance warranted, the question of floor space is undoubtedly one to which somewhat more attention might reasonably have been

devoted. It is closely associated with the feeding and milking of the cows; with the removal of the manure; and more especially with the cleanliness of the milk. The area required by a cow for her comfort is very much regulated by her size, but all require about a similar number of square feet for proper attention. With passages of the width suggested for the different designs of cow-houses, a floor space of from 40 to 50 square feet will be provided per cow, and for the larger class of animals it may with advantage go higher for some of the principal designs. These areas may by some be considered excessive, but it should be remembered that every increase in the floor space also adds to the cubic space, and both materially assist in keeping the air in the building in a reasonable state of purity.

Cubic Space.—By sanitary officers cubic space has hitherto been the standard by which they gauged the efficiency or non-efficiency of a cow-house. Provided that this detail corresponded with their ideal, little attention was devoted to the other matters already referred to, which have a greater influence on the purity of the milk or health of the stock than does cubic space. It is a very necessary detail of a healthy cow-house, but it has hitherto been given an importance far greater than it deserved. This has been brought about under the mistaken idea that in a building with a large cubic space the air remained approximately pure much longer than where the cubic space was smaller. Where buildings such as churches, halls, and theatres, &c., are occupied for a limited time compared with the interval during which they are empty, the inference is reasonably sound, but when applied to the case of a cow-house in which the animals are constantly stalled for half the year, it breaks down entirely. In the one case the building is flushed with fresh air in the intervals between its occupation, while in the other it is seldom that such an opportunity occurs. The consequence is, that the air of a cow-house, no matter how large its cubic space, reaches a high degree of impurity in an hour or two after it becomes occupied, unless provision is made for removing the polluted air, and replacing it by that which is pure.

This was strikingly brought out in the experiments of the Highland and Agricultural Society during the winter of

1908 and 1909, in which the air of several cow-houses of medium and large cubic space, but with limited provision for change of air, was compared with others similarly placed, where it was liberal. In those which were freely ventilated, the cubic space per cow varied from 520 to 1,268 cubic ft. In the smaller building, where fully ventilated, the average carbon dioxide in the air, on an average of fortnightly tests by chemical analysis, was 10·6—the minimum being 6·5 and maximum 15·9—per 10,000, the average temperature being slightly under 49° F. In almost similar buildings, with the ventilation restricted so as to keep the temperature about 60° F., the carbon dioxide in the air of samples taken at the same time as the other was 29·05 per 10,000, and in some instances was as high as 60, 70, and even 88 per 10,000 volumes. On the average of three tests at one of the farms, the air of the freely ventilated building, with a cubic capacity of 1,130 cubic ft. per cow, contained 9·4 per 10,000, while an adjoining building, with 705 cubic ft. per cow, but with little ventilation, contained 29·03 per 10,000. On two of these farms, at about the same elevation, in the same district, and with much the same exposure, the carbon dioxide in the air of the smaller of the freely ventilated buildings was 10·6, while the very large one was 9·4 per 10,000, a difference of only 1·2 of carbon dioxide per 10,000, although the one building is fully double the other in capacity per cow. In the buildings with restricted ventilation, the amount of carbon dioxide was identical in both cases, yet the one building had 480 cubic ft. per cow, while the other had 705 cubic ft. In both cases the samples were taken between two and three hours after the buildings were closed for the night.

In another case, with buildings at a high altitude and exposed situation, but having a large cubic capacity, the dangers and difficulties of attempting to maintain a high temperature in the cow-house are very evident. The ventilated building, with a cubic capacity of 1,268 ft. per cow, and an average temperature of 49° F., had on an average of four tests 19·7 of carbon dioxide per 10,000 volumes of air. In the other half of the same building, where the cubic space was 918 cubic ft. per cow, and average temperature 57·5° F., the carbon dioxide in the air on an average of four tests

was 60 per 10,000 volumes of air. At the other farms where this experiment was carried out almost identical results were obtained. The average for twenty-one tests made on five farms in mid-winter gives 12·8 volumes of carbon dioxide per 10,000 of air for the buildings more or less freely ventilated, and having an average temperature of 49·8° F., while a similar number of trials on the same evenings in similar adjoining buildings, but with restricted ventilation and an average winter temperature of 59·4° F., the carbon dioxide present was 34·7 volumes per 10,000 of air. The results of this experiment emphatically show that there is no gain in purity of the air, corresponding with the cost, in buildings of very large cubic capacity per cow compared with those of more moderate size. They also prove that if any cow-house, no matter what its cubic space per cow, is kept at a temperature of 60° F. or more, its air will contain about three times as much carbon dioxide than if the building had been freely ventilated and kept at under 50° F. While the production of milk may be as great in the one case as in the other, the health of the animals in the freely ventilated building will remain good, while the constitution of the others will gradually become enfeebled.

If the other details in connection with the construction of the building are attended to, it will be found that fairly good results may be obtained if 420 to 450 cubic ft. are allowed for the smaller breeds of cows, such as Jerseys and Kerrys, and young Ayrshires. Breeds of, say, the size of the Ayrshire should be allowed a minimum of 500 cubic ft., and the larger breeds, such as Shorthorns, say, 600 cubic ft. While there will be some advantage in increasing these minima by 20 to 30 per cent., little return will be obtained for the money expended in making them any larger.

Ventilation.—Closely associated with cubic space, but in reality quite a separate subject, is that of ventilation. While a certain floor and cubic space must be provided before the cows can be conveniently and economically attended to, the health of the animals and purity of the milk will in great part depend on the means provided for ventilating the building. Even the thoroughness of the ventilation is much more a matter of providing in the walls ample openings of any kind

as inlets for the air, and the same in the roof for its exit, rather than any special system of ventilation. No class of building is so easily ventilated as that which is open to the ridge, and in none may the system which is adopted be so simple and inexpensive. The great requisite is to provide for each animal plenty of inlet area, which should not be less than 40 sq. in. per cow, irrespective of doors or windows, which should be reserved for exceptional weather, and if the situation is at all sheltered more should be provided. It does not follow that all available ventilation should be always utilised, but sufficient openings should exist to keep the air fresh—say, 8 to 12 of carbon dioxide per 10,000 volumes when the stock are in, and the air is calm. These openings should be provided with some arrangement by which the inlet of air can be easily regulated to suit the conditions of weather. For instance, if the wind is strong the volume of air which will pass through any opening will be many times greater than when it is calm, and it is to provide for such occasions that some system of regulation is necessary. The old system of putting straw in the openings in stormy weather cannot be recommended, as when a change of weather occurs the straw is almost invariably in when it should be out, and out when it might be in. The outlet ventilating openings should not be less in area than the inlets, and may with advantage be 100 per cent. greater. Like the inlets, the outlets should be provided with some system of partially closing them when it is desired to do so.

The simplest and one of the most serviceable of inlet openings is a flat one, 24 in. by 4 in., or 18 in. by 6 in., in the wall opposite each double stall. This opening should be between 5 and 6 ft. from the floor if the animals are stalled with their heads to the wall, but if a passage intervenes it may be somewhat lower, as in this case the current of cold air becomes modified and diffused in its course across the passage, and before it reaches the cows. If a board 9 to 12 in. broad and 24 in. long is placed flat along the bottom of this opening, and the edge next the outside of the wall is hinged in any convenient manner, an arrangement can be easily fitted up by which each or all of these boards can be raised, so as to reduce wholly or partially the incoming current of air.

The valve may not only be used for reducing the volume of air entering the building, but also for diverting the current in an upward direction, so that it may pass over the bodies of the cows. There are numerous devices for attaining the same end, all of which serve the purpose fairly well.

The simplest system of roof ventilator is a box extending over two or three of the couples, and rising 18 or 24 in. above the ridge, and having louvre boards on the sides. The main point in these is to have them large enough and in sufficient number. Another method is to have the boarding of the roof, for a foot or so on each side of the ridge, hinged on the under edge, so that it opens up and leaves an outlet 12 in. or so wide the whole length of the building. Arrangements have to be made for raising and lowering the flaps from the floor.

Light.—Everybody admits the advantages, so far as health is concerned, of an out-door life, but just how much is due to fresh air and how much to the influence of sunlight it is very difficult to say. Sunlight is, however, known to be one of the most powerful, as it is one of the cheapest, germicides we possess; it therefore should be admitted freely into all buildings occupied by stock. It is a matter of indifference whether it comes from the walls or roof, provided it is ample and does not fall directly on the eyes of the animals. The minimum allowance should not be less than 2 or 3 sq. ft. per cow, and it will be an advantage to have even more than that. Of all the details connected with cow-houses, few of them have received so little consideration as that of lighting. This omission has been in part due to the erroneous belief that stock fatten quicker in the dark than in the light; but, in any case, nothing will contribute so much to cleanliness in the cow-house as plenty of light. It costs little, and its value there is great, if it were for nothing else but to afford an opportunity of seeing the dirt.

Manure and Food Conveyors.—No cow-house can be considered complete which is not provided with an overhead railway for the purpose of removing the manure, and bringing in food and litter. In Canada and the United States these are found everywhere, their cost is trifling, and the labour they save is great. The manure bucket is self-emptying, holds

between three and four barrow loads, and is more easily pushed than an ordinary barrow, and if the rail can be laid with a slight fall to the dungstead, the load may run out and empty itself. Separate buckets are used for the carriage of the manure and the food.

THE INSECT AND ALLIED PESTS OF THE HOP.

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South Eastern Agricultural College, Wye.

The hop is not subject to the attack of very many insects and allied creatures. Forty-two species only of true insects or hexapods—six-legged animals—have been found feeding on the hop in Britain, but of these only seven are of any general importance, namely, three kinds of Wireworm, or larval Click Beetles, the Hop Aphis, the Strig Maggot, the Clay-coloured Weevil, and the Frog-hopper or Jumper. Others, such as the Needle-nosed Hop Bug, Fever Flies, Otter Moth, &c., are only of occasional and local importance, and several recorded here are isolated attacks only. Only one Acarid occurs in sufficient numbers to do any harm, namely, the Red Spider. Two Millepedes are found in hop roots, but some growers still doubt if they are the cause of disease, and say they follow upon it.

One very important hop pest is the Eelworm (*Heterodera schachtii*), causing "nettle-head." It is probable also that the Common Eelworm (*Tylenchus devastatrix*) plays some important part in the dying back of hops. It must take years of patient research, however, before the part they play can be definitely settled. In all cases of *Tylenchus* attack in hops which I have seen in recent years the fungus *Fusoma parasitica* has been present, and it is a question whether the latter is the direct cause of disease or whether the Eelworm makes the plant susceptible to this fungus. With the insect and acarid enemies of the hop, growers can deal, but with eelworm attack they are quite unable to stem the rapid tide of disease that is now flowing. Science can do nothing until much more is known of the bionomics of these minute nematode worms.

The notes given below are merely a few of those collected

during the last sixteen years in Sussex, Kent, Surrey, Hampshire, and Worcestershire.

WIREWORMS (*Elateridae*).

Wireworms (Pl. 1, Fig. 8) are among the most serious insect pests of hops. As is well known, they are the larval stage of beetles known as "Skip Jacks," or "Click" Beetles (Pl. 1, Fig. 9). At least three species, viz., *Agriotes lineatus*, *A. sputator*, and *A. obscurus*, are found in hop hills, but all have a very similar life-history.

These larvæ feed upon the roots, attacking both the fibrous and large roots, and not only gnaw their substance, but eat right into them. They work almost entirely below ground and attack nearly all plants, mustard alone seeming to be free from their ravages. Wireworms are especially harmful on newly broken pasture land, and hops, if placed on such land, are sure to fail, unless the land has been previously treated so as to reduce their numbers. Plants attacked by wireworm put forth sickly shoots, and may even die under their attack.

Life-history.—The Click Beetles appear in greatest numbers in June, but a few occur in May, and some on until August, according to Whitehead, though I have failed to trap any in hop gardens in Kent after the middle of July. Click Beetles can at once be recognised by their shape (Pl. 1, Fig. 9), by their curious skipping movements, and by the noise they make. The one figured is a little larger than natural size, but another species (*Agriotes sputator*) found amongst hops is no more than $\frac{1}{4}$ in. long.

In June these beetles may be found in numbers towards evening on the bine, sometimes at the very top, but more especially crawling up grasses and weeds around the gardens. During the day they mostly seek shelter under stones, clods of earth, &c. They deposit their ova both in and on the soil, and especially choose close vegetation, though this is by no means always the case, for they are found in clean hop gardens and clean gardens as often as where weeds are allowed to flourish, but never in such great numbers. They certainly prefer a dense growth of vegetation if it is anywhere

PLATE I

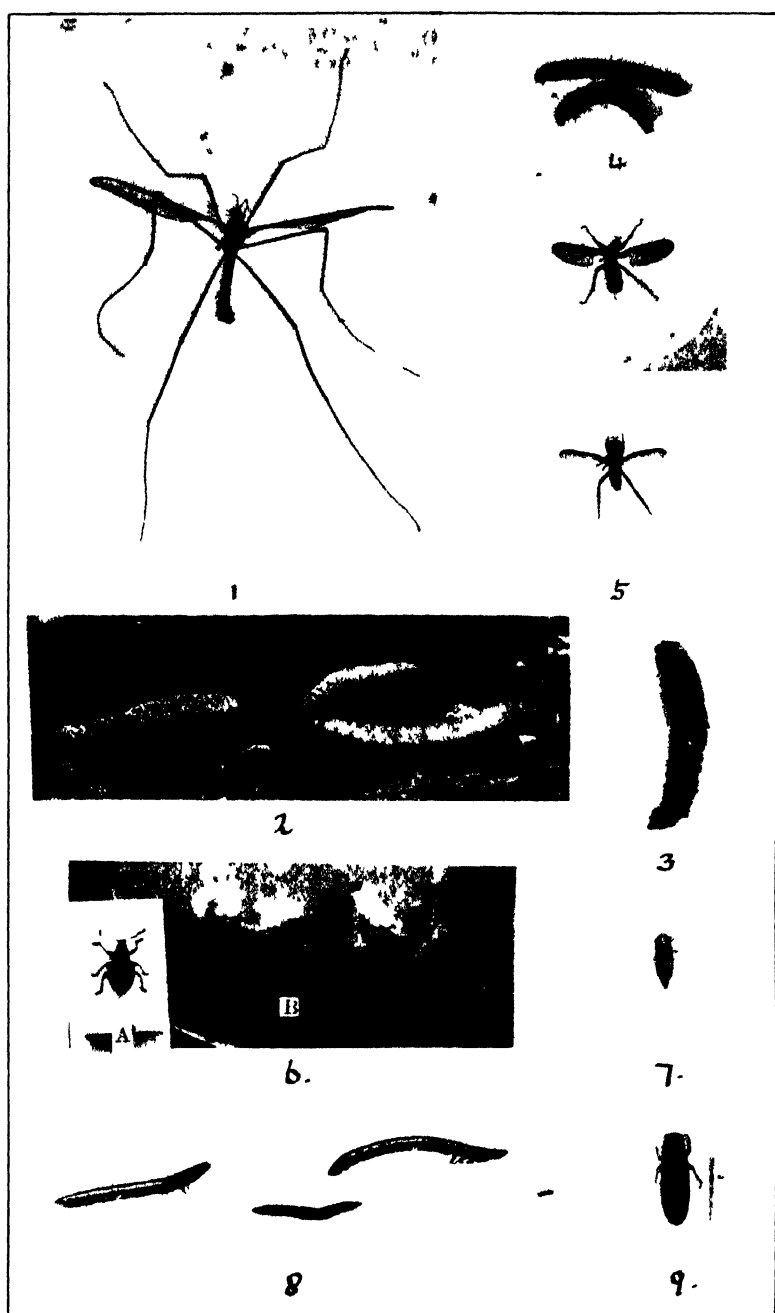


FIG. 1. The Dolly Fly (A) and Larva (B).
 FIG. 2. The Dolly Fly (A) and Larva (B).
 FIG. 3. The Dolly Fly (A) and Larva (B).
 FIG. 4. The Dolly Fly (A) and Larva (B).
 FIG. 5. The Dolly Fly (A) and Larva (B).

FIG. 6. The Clay-colored Weevil (A) and Larva (B).
 FIG. 7. The H. p. Jumper.
 FIG. 8. The H. p. Jumper.
 FIG. 9. The H. p. Jumper.

near them. Hence wireworm are most abundant in permanent pasture and in clover-ley.

The ova hatch into wireworms, as shown in Fig. 8, Pl. I, and these feed upon the roots for three, and in some cases for four, and even five years. They feed all the year round when the weather is not too hard. In sharp and prolonged frost they may burrow deep into the soil and remain dormant, but come up again as soon as the land thaws. Eventually, at the end of three, four, or five years they burrow deep down during the autumn and pupate, and appear above ground as Click Beetles in early summer. The wireworms can at once be recognised by their yellow, shiny, wiry appearance, and by having three pairs of jointed legs in front and a swelling below towards the tail end. They are frequently confused with Millepedes, or Thousand Legs.

Treatment and Prevention.—No substance that can be used on a large scale is known to kill wireworms in the soil. They may be driven or drawn away by such substances as Vaporite or rape cake, but they are not killed, and as soon as the effects of the substances have gone they return to the plant roots.

In hops the only way to get rid of wireworm is the old plan of enticing them away from the stocks by setting pieces of potato, carrot, beetroot, or mangold in the ground close to the hills, and then collecting from these traps and killing them. Some success has been obtained by the use of bisulphide of carbon injected into the soil around the hills, but the varied effect of moisture on this fumigant makes it extremely uncertain in action in this country. The cultivation of mustard in hop gardens and feeding off with sheep will do some good in respect to this pest.

The beetles may also be readily trapped by placing here and there in the alleys heaps of clover or lucerne in May and June, covered over with a few tiles or boards to keep each heap in its place. The beetles go there, and may be easily collected during the day. When we consider the length of life of wireworms and the difficulty of killing them, this plan is well worth considering. The use of rape cake or meal is not recommended, as it undoubtedly attracts the beetles, so that great numbers of eggs are laid, and at the best it only draws the insects away for the time.

Clean cultivation, constant movement of the soil, and trapping around the hills, &c., are the most satisfactory ways of keeping these pests in check. Vaporite has been said to destroy them, but in all experiments I have conducted, both in the laboratory and field, it has had not the least effect, although useful for other purposes.

THE CLAY-COLOURED WEEVIL (*Otiorhynchus picipes*, Curtis).

Complaints have frequently been made from all hop districts of the damage done by Weevils. This damage is two-fold: First the beetles, working at night, bite out pieces of the bine from the tips downwards; the result is that the whole bine flags and dies. Secondly, the larvæ feed on the roots of the hops and eat them away, and may even tunnel into the larger roots. Frequently sets are killed outright. The *Otiorhynchus* beetles work at night and hide away during the daytime, and consequently the culprits are often not detected. This weevil has a very wide food list, attacking raspberries and other fruit, pot plants, and roses. It works in a similar manner on all plants, and occurs all over Britain. Records of its damage to hops have been sent me from Kent, Hampshire, and Worcester.

Life-history and Habits.—The mature insect (Pl. 1, Fig. 6A) varies very much in size; some are no more than one-fourth of an inch in length, others nearly one-third of an inch. The general form is shown in the figure. In colour this weevil varies according to age; fresh specimens are light brown, with darker spots and lines on the back, giving a tessellated appearance. The wing-cases are united together, and there are no wings. The legs are dull reddish-brown, but the feet are black. On their under side the weevils are clay-coloured. After a time they become covered with particles of soil, and are then very difficult to detect when in or on the ground, where they shelter during the day. Sometimes they have been noticed to hide away during the daytime between the bine and the poles or string. They fall from the plants at once on being shaken, and lie upon their backs on the soil feigning death. They appear mainly in May and June, and occur in increased numbers during the summer, laying their eggs in the ground. In a week or ten days the larvæ

hatch out and feed on the roots of the hops and other plants. The grubs (Pl. 1, Fig. 6B) are white or dull creamy, footless, curved, and wrinkled, with a distinct brown head. They feed on the roots all through the winter, and turn to pale brown pupæ in the spring. In length the mature larvæ are about one-third of an inch.

Treatment.—The beetles may easily be collected in two ways: first, by jarring them off at dusk on to tarred cloths, or secondly, by placing pieces of sacking at the base of the bine, where the beetles collect during the day, and can then be easily destroyed. Vaporite is known to kill the larvæ of weevils in the soil, but it is not known if it is effectual on those hidden in the root centres as these are.

OTHER WEEVILS FOUND ON HOPS.

(1) THE IVY AND HOP WEEVIL (*Liophlæus nubilus*, Fab.).

This weevil was recorded attacking hops at Farnham and in several districts in Kent.

(2) THE BLACK OR VINE WEEVIL (*O. sulcatus*, Fab.).

This has also been sent me from hops in Kent in two cases, but not in any numbers.

The first-named especially attacks the tender shoots, and resembles in general habits the *Otiorhynchi*. It varies considerably in size, small males being only one-third inch long, some females as much as three-fifths inch. They are black, covered with ashy-brown scales, the wing-cases having small tessellated spots. They live in hedges, on young trees and ivy, as well as on the hop.

THE BRASSY HOP FLEA.

(*Plectroscelis concinna*, Marsh).

In all hop districts this flea beetle occurs, and in some years it does a considerable amount of harm. Some growers pay no attention to it and say they can keep it in check easily, others that they cannot and that it is a most persistent pest. There is no doubt that in certain years the "flea" does a lot of harm.

The beetle is oval in form, and has shiny, bright bronze to brassy wing-cases; beneath it is black, and its legs are

brown and dull reddish. In size it varies from $1\frac{1}{2}$ to $2\frac{1}{2}$ mm.* Its range extends all over Europe into Siberia. Like all flea beetles, it is capable of considerable jumping movements.

The damage done is twofold. First and foremost, the beetles attack the young and tender shoots, sometimes sweeping them right off, at others making them wilt by gnawing away the tender tissue in patches. Later they riddle the young leaves. This flea beetle, however, rarely does much harm after the bine has once grown strongly.

Life-history.—The beetles pass the winter in all sorts of places, such as under tufts of grass, in woods, at the foot of hedgerows, &c., around the hop gardens. Many have often been found sheltering in broken pieces of bine on the ground. They deposit their ova, one or more a day, beneath the leaves. These eggs give rise to larvæ in from six to nine days. The larvæ tunnel into the hop leaves in the same manner as those of the Turnip Flea. Maturity is reached in from seven to eight days, and then the larvæ leave their tunnels and fall to the ground and pupate just beneath the soil. This stage lasts from ten to fourteen days. I have traced as many as three generations during the year, but have failed to find them reproducing after the beginning of August in Kent and Sussex. Sir Charles Whitehead says they may go on breeding until September. This flea beetle may also be found on various Cruciferæ and on fruit blossom.

Prevention and Treatment.—With regard to preventing the attack of flea, the main thing to aim at is to get a rapid growth early in the year by cultivation and by judicious manuring.

All old bine, after an attack of "flea," should be, as far as possible, destroyed so as to lessen the winter quarters of the beetles. Hedgerows around gardens should be cleaned in winter, and the refuse burnt, as many of the "flea" hibernate there, and come out in early spring when it is warm. It is possible that spraying the soil around the bine with paraffin or sprinkling Vaporite on the soil at the time the "flea" first commences to appear would prevent the attack. We find that if roots are treated in this way the

* A millimeter (mm.) = $\frac{1}{25}$ inch.

first attack, which often comes from a distance, is warded off, and so the subsequent hordes of "flea" are largely prevented. Poultry, especially chickens, if allowed to run in a garden, devour the beetles very readily when they are on the surface of the soil.

I have never yet found a substance that will drive "flea" away when it has once got a firm hold of the plant. Some growers say soot and lime will drive the pest away, others road dust, others get good results with the sweepings of barns dusted over the plant when dew or moisture is on the foliage. Other growers, however, have not met with the same success, but these methods are well worth trying, as there is no one *certain* remedy for "flea." In Germany good results are said to have been obtained with arsenical washes, but in this country spraying with arsenate of lead has proved of no use whatever. Recently a grower in Kent informed me that MacDougall's wash drives this pest away.

THE HOP CONE FLEA (*Psylliodes attenuata*, Latreille).

This is essentially a hop insect, and occurs in Kent, Sussex, and Surrey, and I have also found it in Worcestershire. It differs from the former species in being more elongate, the wing-cases being deep shiny green, and the legs a dull reddish. In length it is about $1\frac{3}{4}$ mm. It is far more injurious than the former species, as it occurs late in the season, and especially when the hops are ripening. Miss Ormerod records it from a note of a correspondent at Kingsnorth, Kent, as occurring on April 22, and states that nine-tenths of the flea there were of that species. This hop flea feeds on the bracts of the cones, and so riddles them that the crop is ruined. It also feeds on the shoots early in the year. If they occur in any numbers when the fruit is small they not only eat it but are said to lay their ova in the cones, and as the larvæ are said to live by burrowing in the bracts and strigs they would cause the whole cones to decay or shrivel up. One garden I examined in 1896 near Ashford was quite ruined by this beetle.

The beetles shelter in the cones in dull weather. They are not active to the same extent as other flea beetles, and cannot

be jarred out of the cones. They winter in the beetle stage just as does the former species.

It seems to confine its work to hops.* A few remedies were tried in the attack at Ashford, but none were of sufficiently definite value to record. Dusting with sulphur perhaps did the most good. Since that time I have not seen any serious attack, but the beetle occurs in all hop districts. I have been unable to find it in great numbers early in the year.

THE COCKCHAFER (*Melolontha vulgaris*, Linn.).

Two cases only of the attack of this grub on hops have been recorded. Both records were from Kent. In June, 1899,† numbers of larvæ were sent from Frittenden, which were attacking the roots, and I found them also in some unhealthy hills near Wye. Knowing the omnivorous nature of this beetle in its larval stage, it is strange that it has not more often taken to this food plant. The larva and beetle are shown in Pl. II., Fig. 2A and C, and another allied form (*Rhizotrogus solstitialis*) (B), which may be expected to be found at any time on hop roots in its grub stage.

The grubs are white to dirty creamy white, and the swollen end of the body shows the dark intestinal contents. They live for three years in the soil, and feed all the year round in open weather, passing deeper into the earth as the cold approaches. At the conclusion of their larval life they burrow deep into the earth and pupate, usually in the autumn. The Chafer beetles hatch out early in spring, remaining in the soil as beetles for some time before they escape to the surface. Not only were they found cutting the smaller roots and fibres, but gnawing away at the larger roots and the downward tap root. They do not, however, work very deeply in spring and summer, and a dressing of Vaporite soon kills them. Mr. Ernest Green has found in Ceylon that they come to the surface and die in numbers where this insecticide is used, and this is also found to be the case here.

* *Journal S.-E. Agric. Coll.* No. 12, p. 63. March, 1903.

† *Journal S.-E. Agric. Coll.* No. 9, p. 41. April, 1900.

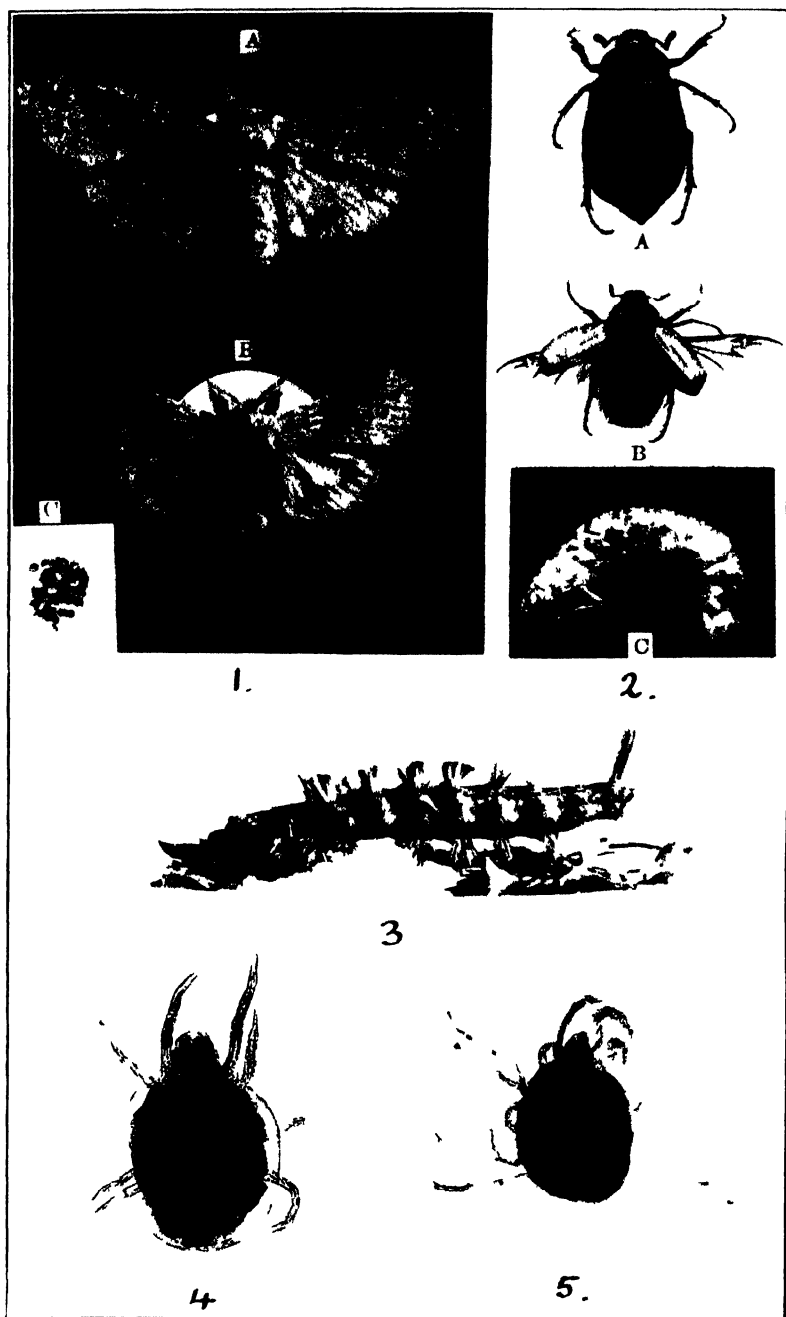


FIG. 1. The Pile Insect Moth. A female
B male. C larva.
FIG. 2. Chaffer. A Cockchafer. B Summer
Chaffer. C Larval Cockchafer.
FIG. 3. The Hop Dog, the larva of Fig. 1.

FIG. 4. The Hop Red Spider (greatly
magnified).
FIG. 5. The same showing silken
threads (greatly magnified).

THE OTTER MOTH (*Hepialus humuli*, Linn.).

The large caterpillars of this moth are sometimes sent as a hop pest. It is quite likely that they are accountable for a good deal of damage which is attributed to other causes. Not only are the outer parts of the smaller roots devoured by them, but they also tunnel right into the main roots. As a rule they work some little way beneath the soil, and so are not detected. Besides hops they also feed on the roots of docks, thistles, and the burdock. This insect is also known as the Ghost Moth and the Hop Vine Caterpillar.

The male moth has satiny white wings, dusky beneath, and a dusky body; the female has the front wings marked with ochre-yellow and brick-dust red to orange. The wing expanse varies from $1\frac{1}{2}$ to 2 inches. These moths fly at dusk and in the dark, and have a curious, pendulous, erratic flight. They drop their eggs when in flight, usually in June. The caterpillars hatch in about two weeks, and at once burrow to the roots, where they remain feeding until the following April. Pupation takes place in the soil, the pupæ being chestnut-brown.

Treatment consists in examining the plant centre when it shows signs of flagging to see if the large white caterpillars are present, and destroying them if found. Nothing can be done with any success by dressings, for the cause of the unhealthiness cannot be ascertained for certain, unless the roots are examined. Nor can anything be done to prevent the moths from dropping their eggs. Needless to say, all docks, thistles, and burdock, as well as long grasses should be kept down around the gardens. The mole should be encouraged, for it feeds on this larva as well as upon wireworm and leather jackets and the smaller Bibio-grubs.

THE HOP DOG OR PALE TUSsock MOTH.

(*Dasychira pudibunda*, Linn)

Although one can scarcely say this insect (Pl. II., Fig. 1) is a pest, it is sufficiently abundant in the hop gardens of this country to call for a few comments. In some years it is much more abundant than others; in nearly every case a plentiful

year is followed by one in which scarcely a hop-dog can be found.

The larvæ are found in August, September, and October. At first they remain in clusters, their heads together. In a week they wander over the bine. When full grown (Pl. II., Fig. 3) they are very beautiful creatures, subject to much variation. The commonest form on hops is a pale yellowish-green, becoming reddish or brownish, with four large hairy tufts on the back, and between these deep velvety black patches and another after the last tuft; the twelfth segment is provided with a dull red to purplish tail-like tuft pointing upwards, the whole body being covered with long hairs. When mature they reach nearly two inches in length, and spin a delicate cocoon amongst the leaves. The pupæ are dark chestnut-brown to black, and have two paler bands upon the body. The pupæ remain on the dead leaves, &c., all the winter; others are found on the poles, others on weeds, and on trees around the hop gardens. This caterpillar also feeds upon alder, elm, hornbeam, and beech, and numbers have been found on wild hops in the hedgerows in Kent. No steps save hand-picking need be taken in regard to this insect, and this only in exceptional cases.

OTHER LEPIDOPTERA FOUND ON HOPS.

Several other Lepidopterous caterpillars feed on the hop, but do not occur in sufficient numbers to do any harm.

The spiny larvæ of the Comma Butterfly (*Vanessa C.-album*, Linn.), may be found in Worcestershire and Herefordshire, sometimes in considerable numbers. The large caterpillars of the Eyed Hawk Moth (*Smerinthus ocellatus*, Linn.) have also been noticed on hops in Kent.

The Hop and Currant Pug Moth (*Eupithecia assimilata*, Gn.) is found in Kent in its larval stage on hops, as well as on currants in September and October. Just about picking time the long stick-like greenish caterpillars of the Pepper and Salt Moth (*Amphidasys betularia*, Linn.), called "Hop Cats," are of frequent occurrence, whilst it is not unusual at this time to notice the hairy Vapourer Moth (*Orgyia antiqua*,

Linn.), and earlier in the season those of the Gold Tail Moth (*Porthesia similis*, Fues).

The Snout Moth (*Hypona rostralis*, Linn.) also occurs in small numbers. I have only once been able to find it on hops in Kent, but Miss Ormerod includes it amongst the hop pests in her *Manual of Injurious Insects*, saying, "The caterpillars of this moth injure the hop by feeding on the leaves." They are pale green in colour, with clearer spots, and a whitish line on the sides and back; slender in shape, and gradually smaller towards the head, and have only three pairs of sucker feet.

THE STRIG MAGGOT.
(*Diplosis humuli*, nov. sp.)

In Kent, Hampshire, and Worcester hops are sometimes attacked by the larvæ of a small midge, a *Diplosis*—related to the Pear Midge. It occurs, or has been recorded, near Canterbury, Maidstone, Gravesend, Sevenoaks, various places in the Weald, Selling, at Alton in Hampshire, and at Tenbury in Worcestershire.

These maggots do a considerable amount of harm, and, although the attack is not general, it is usually very severe where it does occur. Generally isolated patches are attacked in a garden at first, but if left the midge will spread over the whole garden. The damage is done by the small white footless maggots tunnelling up the stem or strig of the hop cone, which is destroyed, and the central area of the cone becomes a dark mass, and the bracts fall off or turn brown. The injury is shown in Pl. III., Figs. 1, 3, and 4, normal cones being shown for comparison in Fig. 2. As many as fifty of these maggots may sometimes be found in one cone. Specimens received on August 31st of this year showed the maggots in all stages, some very small, some nearly full grown. Miss Ormerod records them from Watlingbury as late as September 10th. It is probable that they mature between the last week in August and the middle of September. Miss Ormerod records that in 1883 all had gone by September 27th at Sevenoaks.

Like all maggots of the genus *Diplosis*, they have the power of jumping into the air, and in this way, as the cones

decay, they become free and fall to the ground. Shortly after reaching the soil, they enter it, and remain there all the winter. On entering the soil these white larvæ change into pupæ in a so-called puparium case, which is formed of the hardened skin of the maggot. Exactly when the small two-winged midge appears and in what stage of the hops it lays its eggs we do not know, nor has the mature insect yet been bred. As the pest seems sometimes to spread with great rapidity, it is as well to treat it in a drastic way when it first appears on a small area. The hops should be picked and either destroyed or, if possible, left until nearly ripe and then dried before the maggots start escaping. When a large area is invaded, probably the best way to check it would be to fold sheep heavily in the garden so as to trample and foul the land well. No substance yet known will destroy the puparia in the soil, but any caustic dressing spread around the infected plants just prior to the falling of the grubs would destroy them. But whether such substances as Vaporite, which will kill the grubs, would harm the hops in early September is a matter for experiment. If not, this would be the best treatment. This pest has been very prominent during the present year.

THE DADDY LONG-LEGS, OR CRANE FLY.

(*Tipula oleracea*, Linn.)

Several cases of the damage done by Leather Jackets to hops, especially plants up to their first year of polling, have been observed or reported to me during the last sixteen years. In all cases the larvæ sent proved to be those of the Common Crane Fly (*Tipula oleracea*) (Pl. I., Fig. 1). These grubs (Fig. 2), which are so well known as root pests, feed mainly upon the fibrous rootlets and small roots, but in one case they had eaten their way into the larger roots, and were completely buried in them.

The Crane Fly larvæ feed all through the winter. They may easily be drawn away from the plant centres by placing a turf of grass upside down on the ground close to the hill in late autumn, and then be collected and crushed. The larvæ and pupa are shown in Figs. 2 and 3, Pl. I.



FIG. 1.—Hop Cone attacked by Strig Maggot.

FIG. 2.—Hop Cone showing Strig hollowed by Maggots.

FIG. 3.—Hop Cone showing Strig Maggots at work.

FIG. 4.—Hop Cone showing Strig hollowed by Maggots.

FIG. 5.—A Female Fly (H. teretis) on Hop Cone with Ovipositor (greatly enlarged).

BLACK OR FEVER FLIES (*Bibionidæ*).

At least three species of *Bibionidæ* are, in their maggot stage, to be found attacking hops.

These flies (Pl. I., Fig. 5) are quite harmless in the adult condition, but the larvæ feed on the roots of hops, and frequently kill the sets outright. Damage to hops has been reported to me from Kent, Surrey, Hants, and Worcester. All three species bred from hops (*Bibio marci*, *B. hortulanus*, and *Dilophus febrilis*) feed on all manner of roots, beside those of the hop. These grubs (Pl. I., Fig. 4) resemble small Leather Jackets (p. 566), but may be recognised at once by the fleshy spines or processes at the sides of the body and on the back. They usually occur in masses or in groups not far from one another; in hops they occur mainly in a group close around the centre of the hill. Whilst the weather is not too cold they remain feeding all the winter into the spring, when they pupate in the soil and appear as winged insects early in the year.

Sometimes these black flies occur in swarms. Ormerod records *Dilophus febrilis*, or the Fever Fly, in vast numbers collecting in hop cones at Rainham, but they were doing no damage. This species occurs first in May and June and then again in August, but the two *Bibios* in May and June only. Whitehead mentions cones being sent to him from the neighbourhood of Maidstone full of these flies, and which he said "had evidently much injured the cones." One cannot see how they can have done so unless they died in the cones and were so preserved in drying. The adult fly is black in the male, paler in the female, and is about $\frac{1}{4}$ in. long. The grubs are dirty white, with brown heads, and are about $\frac{1}{4}$ in. long. The pupæ are pale brown in colour.

Bibio hortulanus, Linn., is black in the male, with greyish wings, whilst the female has the thorax and abdomen tawny, the former black in front and at the sides, the head and legs black, and in length it reaches $\frac{1}{2}$ in.

B. marci, Linn., is black in both sexes. The larvæ of these two are slaty in colour, and are figured natural size.

Fortunately, these grubs can be easily trapped by placing rotten roots in the hills, and both soot and lime are very

obnoxious to them. I have found Vaporite fatal to them. Sometimes these grubs are to be found in numbers in manure, and there is no doubt that in this way they get carried into the hop gardens.

THE HOP-LEAF MINER (*Agromyza frontalis*, Mg.)

The larvæ of this small fly are frequently to be found in the leaves of hops, where they form tunnels between the upper and lower surface of the leaves; but they never occur in sufficient numbers to do any harm. It is not recorded as British by Verrall, but it is evidently Meigen's species, and was referred to by Whitehead in speaking of the Strig Maggot as follows: "Others hold that they are the larvæ of a species of fly, *Agromyza frontalis*, which are also known to be leaf- and stalk-miners." This species is now known to have nothing to do with the strig attack.

THE NEEDLE-NOSED HOP BUG.

(*Calocoris fulvomaculatus*, De Geer.)

On one occasion only have I seen any harm sufficient to call for any special comment caused by this insect in hops. This was near Tonbridge in 1895, and recorded in the *Journal of the S.-E. Agricultural College*.* Whitehead had previously reported two "bugs" as destructive to hop plants, namely, *Lygus solani* and *L. umbellatum*, which were especially noticed in 1880. The former I have never been able to find in hop gardens, and the latter is the common *L. pratensis*, Fabricius, which is found on many plants, but very rarely on hops.

In 1880 another hop bug was destructive in a small way, namely, *Nemocoris nemorum*, Fall. This was particularly noticed around Canterbury, and, in spite of statements that the damage was probably caused by the Jumper (*Euacanthus interruptus*), I am convinced, from what I have seen, that this bug does feed on the bine as well as upon Aphis. An allied species, *A. confusus*, I noticed in great numbers in 1895, but the damage was slight compared to that caused by the species dealt with here.

No mention has been made of these insects in recent years

* *Journal S.-E. Agric. Coll.* No 2, p 11. Sept., 1895. F. V. Theobald.

in Kent, and I have been unable to trace any damage caused by them in other hop districts.

The damage done by these bugs is twofold—first by their puncturing the leaves, but to so small an extent that no notice is taken of it. The chief harm they do is by puncturing the bine, especially the young, tender bine, and causing it to stop revolving or to wilt. Wherever the punctures had been made a drop of sap was noticed to be flowing, and later, where this puncture was made, a marked scar resulted.

Bine that had been attacked at Tonbridge was not half up the poles, and this was especially noticed in Fuggles. A dense low growth of laterals was thrown out, and the crop was practically nil.

Life-history, Habits.—This insect, like other plant bugs, is most active in bright weather. It is very timid in all stages, and runs around the bine directly one goes near it, or if shaken falls to the ground. If winged, the least jar sends it off in a downward flight. They feed also on Umbelliferæ, on Ash and Birch, and occur in numbers on Hazel. They also have been recorded by Douglas and Scott on Black Currants at Darenth, and I found them on the same at Capel.

The only attack of any importance was in a garden where poles were in use. The mature insect is olive to dark olive brown, the females being paler than the males, sparsely covered with a dull golden pubescence. There are ochreous and dull reddish tints in the wings, and their apices are darkened, with a paler spot towards the opaque basal area; there are two dark spots on the front region of the body, and the legs are ochreous, with the femora or long basal area mottled with dark brown. In length they are about $\frac{1}{3}$ in.

The young or larval stage is greenish and reddish brown, with a yellowish green band on the abdomen. The pupa is easily told by the wing buds. Young larvæ may be found in late May and June, the latest date recorded being June 20th.

Although the young and pupal stages are not so active as the adults, they nevertheless evade observation in a remarkable manner, and for this reason, together with certain

apterous insects, have acquired the name of "Shy Bugs" in Kent. Their winter stage is unknown.

Remedies.—No washes have so far been found of any use for such insects unless so potent that they damage the hops. Growers should look out for any undue incursion of this insect, and then at once have the bines jarred to collect the young before they become winged.

THE HOP JUMPER OR FROG FLY.

(*Euacanthus interruptus*, Linn.)

This is another bug which is far better known amongst hop growers than the former. It does not appear to have been known to the older writers on hops, however, nor has it been noticeable to any marked extent during the past fourteen years.

The Hop Jumper or Frog Fly first became prominent in 1865, and seems to have increased in some parts of Kent and Hants up to 1890, and in the last ten years of that period it did considerable harm in a few districts. It was quite serious at Alton in 1881, and it was said to become abundant there every other year. Like the Needle-nosed Hop Bug, this "Jumper" feeds by sucking out the sap, mainly from the leaves. The result is that the leaves turn yellow and cause a so-called "yellow blight." Later the foliage goes brown and falls, and growth may be completely arrested. If the bine is full of vigour it may grow right away from the attack, but if it is slack, little or no crop may be the result.

The leading shoots cease to revolve, just as in the *Calocoris* attack, and the leaves curl up. The bine is also punctured, and little beads of sap exude, as in *Calocoris* injury.

The life-cycle is unknown, but it is almost certain that young are hatched in late summer and hibernate in any convenient shelter. It is the young larvæ that are first noticed on the hops, and they moult their skins, which remain attached to the leaves. A later moult brings them to the nymph stage, in which they are still active and continue to feed. The adult is most agile, jumping for a considerable distance when disturbed.

The perfect insect, shown natural size (Pl. I., Fig. 7), varies in colour. The commonest form is yellow, with long dark

marks on the front wings, and in some specimens a red coloration appears. Ormerod and Whitehead are the only observers who have recorded it. At present it does not appear to be at all abundant, and in the last six years I have only been able to obtain a single specimen. There seems some evidence to show that the Jumpers in the immature stage pass the winter in crevices in hop poles, &c., for Ormerod clearly shows a case of infestation in Hampshire due to poles coming from a previously infested garden.

The small Jumpers are first seen on the lower leaves of the hops. No washes will kill adult Jumpers, but the young larvæ are said to be destroyed with paraffin emulsion. Paraffin in any form on hops is liable to do a good deal of harm, and should certainly never be used unless under very exceptional circumstances, and then with great care. Nicotine wash is fatal to this insect and its allies—even the Cuckoo Spit—in the immature stages, and would be the best wash to use. The adult Jumpers are best collected mechanically by “jarring” them off on to tarred boards held on each side of the hills.

(To be continued.)

AGRICULTURAL RETURNS OF 1909.

THE preliminary statement of the acreage and live-stock returns issued by the Board on the 20th September shows that the total acreage under crops and grass in Great Britain amounted to 32,183,073 acres in 1909, this representing a decline of 28,313 acres from the area so returned in 1908. The changes in the extent of arable and pasture land, respectively, and in the chief categories of crops, may be summarised as follows:—

Crops	1909.	1908.	Increase or Decrease.	
			Acres.	Per cent.
Cereal Crops	Acres. 7,023,086	Acres. 6,914,595	+ 108,491	+ 1·6
Other ..	3,203,851	3,144,083	+ 59,768	+ 1·9
Clover and rotation grasses	4,214,590	4,421,587	- 206,997	- 4·7
Bare fallow	289,141	315,252	- 26,111	- 8·3
Total arable ..	14,730,668	14,795,517	- 64,849	- 0·4
Permanent pasture	17,452,405	17,415,869	+ 36,536	+ 0·2
Total .	32,183,073	32,211,386	- 28,313	- 0·1

Cereal crops, other crops, and permanent pasture have increased, while clover and rotation grasses and the uncropped area have declined.

The increase under cereals amounts to 108,491 acres, which brings the figure for these crops nearly up to that returned in 1906. Other crops show an increase of nearly 60,000 acres, or 1·9 per cent. Clover and rotation grasses show the large decrease of nearly 207,000 acres, or 4·7 per cent., or the lowest figure recorded for clover since 1869, and the area for bare fallow has also declined by 26,000 acres. The decrease in arable land amounts to nearly 65,000 acres, or not quite $\frac{1}{2}$ per cent., of which 36,500 acres are accounted for by the further extension of permanent grass.

Among the cereal crops, increases are recorded in wheat, rye, beans, and peas, while barley and oats have declined. Wheat shows the large increase of about 197,000 acres, or 12 per cent., which brings the area under this cereal almost up to that returned in 1900, when the figure stood at 1,845,000 acres. There is a very small decrease in barley, and this further decline again makes the area under this crop the lowest on record. There is a substantial decline in the oat area, amounting to 127,000 acres, no doubt consequential upon the increase in wheat, and the area under oats this year is the lowest returned since 1899.

Both beans and peas show considerable increases, with 19,000 and 20,000 acres respectively, but the relative increase in the case of peas is almost double that of beans.

The details of the cereal crops are given in the following table :—

Crop	1909		1908		Increase or Decrease.	
	Acres.		Acres		Acres	Per cent.
Wheat	1,823,563		1,626,733		+ 196,830	+ 12·1
Barley	1,664,394		1,667,437		- 3,043	- 0·2
Oats	2,981,789		3,108,918		- 127,129	- 4·1
Rye	55,566		52,744		+ 2,822	+ 5·4
Beans	313,864		295,024		+ 18,840	+ 6·4
Peas	183,910		163,739		+ 20,171	+ 12·3

Among other crops, increases are almost general, the only instances to the contrary being cabbage and kohlrabi and

hops. Potatoes show an increase of over 13,000 acres, or 2·4 per cent., an almost identical increase to that shown in 1908, and the loss of 17,000 acres noted in 1907 has now been more than recovered. The area under turnips and swedes, which has decreased almost continuously for many years past, shows a small recovery of nearly 5,000 acres. The area devoted to mangold shows a substantial increase of 29,000 acres, or 6·7 per cent., and is the largest figure ever returned. Vetches or tares have also increased by 10,000 acres, or 8 per cent., and lucerne again exhibits a small increase, so that its total is the highest ever recorded.

The area under small fruit has steadily increased since 1897, and this year there is a further increase of 2,200 acres, or over 2½ per cent. Hops have declined by over 6,000 acres, or over 16 per cent.

The green and other crops are summarised in the following table :—

Crop	1909	1908	Increase or Decrease.	
	Acres	Acres	Acres.	Per cent
Potatoes	575,461	562,105	+ 13,356	+ 2·4
Turnips and Swedes	1,555,542	1,550,897	+ 4,645	+ 0·3
Mangolds	456,496	427,772	+ 28,724	+ 6·7
Cabbage and kohl rabi	84,588	86,372	- 1,784	- 2·1
Rape	87,443	86,495	+ 948	+ 1·1
Vetches or tares	136,245	126,083	+ 10,162	+ 8·1
Lucerne	65,327	65,156	+ 171	+ 0·3
Hops	32,539	38,921	- 6,382	- 16·4
Small fruit	87,116	84,880	+ 2,236	+ 2·6
Other crops	123,094	115,402	+ 7,692	+ 6·7

The area returned as reserved for hay, whether permanent or rotation grass, shows a substantial decline, amounting in all to nearly 370,000 acres. Of the area for grazing, there has been a decline of some 10,000 acres among the clover and rotation grasses, but permanent grass has increased by 209,000 acres.

Among live-stock, horses, cattle, and sheep have each increased, but pigs show a considerable decline. From the next table it will be seen that there has been a slight increase, amounting to 1·1 per cent., in the number of horses used for agricultural purposes (including mares kept for breeding), but that, on the other hand, there have been small decreases

Crop.	1909.	1908.	Increase or Decrease.	
	Acres.	Acres.	Acres.	Per cent.
Clover and rotation grass—				
For hay... ..	2,035,827	2,232,353	- 196,526	- 8·8
Not for hay	2,178,763	2,189,234	- 10,471	- 0·5
Total	4,214,590	4,421,587	- 206,997	- 4·7
Permanent grass—				
For hay... ..	4,777,559	4,949,791	- 172,232	- 3·5
Not for hay	12,674,846	12,466,078	+ 208,768	+ 1·7
Total	17,452,405	17,415,869	+ 36,536	+ 0·2

in both classes of unbroken horses. Taking horses as a whole, there is an increase of over 7,000.

Horses.	1909.	1908.	Increase or Decrease.	
	Number.	Number.	Number.	Per cent.
Horses used for agricultural purposes ...	1,132,014	1,119,324	+ 12,690	+ 1·1
Unbroken horses—				
One year and above ...	294,657	299,809	- 5,152	- 1·7
Under one year ...	126,322	126,538	- 216	- 0·2
Total	1,552,993	1,545,671	+ 7,322	+ 0·5

Cattle, on the whole, exhibit a satisfactory increase of 116,000, or 1·7 per cent. Cows and heifers in milk or in calf have increased by some 30,000; other cattle of two years old and above have declined by 55,000, but substantial increases are recorded in the next class of younger cattle of 58,000, or 4 per cent.; and in calves of 81,000, the latter figure representing an increase of 6 per cent., a proportion that has rarely been exceeded.

All classes of sheep show an increase, amounting, on the whole, to nearly 500,000, or 2 per cent., and the total of 27,618,000 is the highest figure recorded since 1892. The number of ewes kept for breeding is the largest returned since this class was first separately distinguished in 1893, whilst the number of other sheep under one year is greater

than in any year since the returns were first collected, with the exception of 1868, when it was just over 11,000,000.

Cattle.	1909.	1908.	Increase or Decrease.	
	Number.	Number.	Number.	Per cent.
Cows and heifers—				
In milk.	2,232,218	2,197,763	+ 34,455	+ 1·6
In calf but not in milk...	561,958	566,017	- 4,059	- 0·7
Other cattle				
Two years and above ...	1,317,215	1,371,688	- 54,473	- 4·0
One year and under two	1,473,918	1,415,483	+ 58,435	+ 4·1
Under one year	1,435,673	1,354,183	+ 81,490	+ 6·0
Total	7,020,982	6,905,134	+ 115,848	+ 1·7

Pigs show a considerable decline of over 442,000, or nearly 16 per cent., the decline in breeding sows being 53,000, or over 14 per cent., and in other pigs 390,000, or 16 per cent.

Sheep.	1909.	1908.	Increase or Decrease.	
	Number	Number.	Number.	Per cent.
Ewes kept for breeding .	10,810,476	10,569,089	+ 241,387	+ 2·3
Other sheep—				
One year and above ..	5,860,907	5,632,767	+ 228,140	+ 4·1
Under one year	10,917,036	10,917,874	+ 29,162	+ 0·3
Total	27,618,419	27,119,730	+ 498,689	+ 1·8

The Report on the proceedings of the Board of Agriculture and Fisheries under the Acts relating to Small Holdings and Allotments, Universities and College Estates, Glebe Lands, Improvement of Land, and certain other Acts, is being issued in two parts.

Part I. [Cd. 4846, price 8d.], which has just been published, contains the Report of the Small Holdings Commissioners (Mr. E. J. Cheney and Mr. M. T. Baines) on the administration of the Small Holdings Act during 1908.

Stated shortly, the result of the first year's work since the Small Holdings and Allotments Act, 1907, came into operation, has been that 23,285 applications have been received by

County Councils for 373,601 acres; that 13,302 applicants have been approved provisionally as suitable; that the estimated quantity of land required for the suitable applicants is 185,098 acres; that 21,417 acres have been acquired by County Councils, of which 11,346 acres have been purchased for £370,965, and 10,071 acres leased for total rents amounting to £11,209; that the land acquired will provide for about 1,500 of the applicants; and that 504 of them were in actual possession of their holdings on December 31st, 1908.

The progress that has been made in satisfying the keen demand for small holdings which the Act has disclosed may seem small at first sight, but the figures cited above do not give at all an adequate idea of the amount of work that has been actually done, as practically the whole of the first six months of the year were occupied in the preliminary work of constituting committees, issuing forms, receiving and tabulating applications, and holding local inquiries, and until this work was completed little progress could be made in the acquisition of land. The rate at which land is being acquired is now increasing rapidly, and the Commissioners anticipated that by Michaelmas, 1909, not less than 50,000 acres would be obtained. In addition to the holdings which have been provided by County Councils, over 700 applicants have been supplied with holdings by landowners direct, mainly through the intervention of the Councils.

In considering the results already accomplished it must be borne in mind that the problem is to fit particular men to particular land, and not merely to acquire whatever land may be in the market and to offer it in small holdings. The great majority of the applicants desire land in close proximity to their homes, and it is obviously more difficult to acquire a large number of detached plots than to take a whole farm or estate and divide it into a number of small holdings.

It is also necessary before a Council can finally decide to acquire land under the Act that they shall satisfy themselves that the applicants are prepared to pay sufficient rents to guard the Council against loss, and this involves careful and detailed negotiation, which necessarily occupies considerable time. For these reasons it is safe to say that at least three times as much land as has been actually acquired

has been considered and reported on, only to be rejected as unsuitable or prohibitive in price.

Further, the increased prosperity of agriculture during the last few years is an important factor in the situation. The demand for farms is keener at the present time than it has been for many years past, and there has been a corresponding appreciation in the value of agricultural land.

In view, therefore, of all the circumstances, the Commissioners consider that the results already achieved under the Act may be regarded with satisfaction, and that there has been little or no avoidable delay in carrying out the intentions of Parliament. At the same time, they observe that it is not altogether a disadvantage at the commencement of the movement that progress should be somewhat deliberate. It is most important that mistakes should not be made at its inception, that the system should be established on a strictly economic basis, and that the work should be accomplished with the goodwill and co-operation of all classes connected with the land. Too great haste will inevitably bring disaster. It is not enough merely to place men on the land. The whole machinery of co-operative organisation, coupled with increased facilities for agricultural education, must be built up in order that the small holders may be able to make the best of their land and to dispose of their produce at remunerative prices. If too large a number of small holders be set up before this is done the result will be not only that many of the newly established small holders will fail, but also that they will bring down with them a number of old-established small holders who are now making a decent living, but who will be unable to withstand the excessive competition and flooded markets caused by the creation of a numerous body of rivals.

It is also most important from the point of view of the small holder that he should not be established at the cost of injustice to the farmers among whom he will have to live, and who will have it in their power to give him valuable assistance, without which he may be handicapped considerably. With a reasonable amount of goodwill on both sides it will be possible to acquire vacant farms and to take away portions of large holdings without any real damage being

done to tenant farmers, while the establishment among them of sturdy and industrious small holders who will increase the supply of labour in the locality cannot but be a real benefit to all concerned.

The Report gives an account of the procedure adopted for ascertaining the demand for holdings, and it is mentioned that the applicants have been drawn from almost every class of the rural population. Out of the 13,202 approved applicants about 4,470, or nearly 34 per cent., are agricultural labourers. The demand in most cases is not for holdings to which the tenant will devote his whole time and from which he will obtain his whole livelihood. An agricultural labourer has little spare time for the cultivation of more than a small allotment, and unless he has saved enough money to be able to take a holding of thirty or forty acres he would not as a rule be justified in giving up his daily work. Experience has shown that a living cannot be made easily from a smaller holding than thirty acres, unless it is devoted to market gardening, fruit growing, or to some special form of cultivation, and in those cases the capital required is considerably more per acre than in the case of an ordinary agricultural holding.

A considerable number of the applicants have withdrawn their applications on realising that councils will be unable to let small quantities of accommodation land at the same rent as is paid by farmers for large farms, and many applicants who have applied for particular pieces of land decline to take any other land if that cannot be obtained.

The information obtained shows, however, that the demand already disclosed is only a part of that which actually exists. Many men are sceptical as to the *bonâ-fides* of the Act, and are deferring their applications until they see how their friends and neighbours fare, and as soon as a certain number of tenants have been successfully established on their holdings there will no doubt be a large additional crop of applications.

In some parts of the country the Commissioners report that there is undoubtedly a widespread fear lest the fact of application having been made for land should be resented by their employers and the applicants should be turned out of their

cottages and lose their employment. A certain number of complaints have been received that such intimidation has been actually exercised in the case of certain applicants, and by direction of the President special inquiries have been made into every such case. Some of the complaints proved to be unfounded, and in others it was impossible to prove that the action taken was mainly or at all due to the fact of application having been made for a small holding, but in one case at least there is no room for doubt that such intimidation was exercised.

The Commissioners also mention that they have personally interviewed a large number of the applicants for small holdings, and they desire to place on record the fact that in their opinion a very considerable number of the approved applicants are industrious, self-reliant, and capable men of a very superior type. All over the country there are men who for years have been desiring to obtain land and who have both the capital and the knowledge that are necessary to make them successful small holders. It is just this type of man who too often in the past has despaired of obtaining land in this country and has emigrated to the Colonies, and it is hoped, therefore, that councils will recognise the importance of retaining men of this stamp in the country and will use every endeavour to provide them with holdings at the earliest possible date.

The appendix to the Report contains a summary describing the steps taken by each County Council in carrying out the Act, together with particulars of the applications received and the various circulars, &c., issued by the Board.

Dr. Grossenbacher* has recently described a disease caused by *Mycosphaerella citrullina*, Grossenb., which proves very destructive to melons in the United States. The disease is first indicated by the wilting of the leaves, after which the entire plant collapses and dies.

The nodes of the stem, especially those nearest the root, present a water-logged appearance, often accompanied by an exudation of gum. At a later stage the diseased patches

**Cucumber and
Tomato Canker.**

* New York Agric. Expt. Sta., Technical Bull. No. 9 (1909.)

change to an ashy-grey or whitish colour, and the epidermis becomes broken up and studded with numerous perithecia belonging to the conidial stage of the fungus. This is followed by the production of the ascigerous condition of the fungus when the host is dying or dead. Infection experiments proved that the spores of the fungus could infect uninjured melon plants, also other allied plants, although, curiously, the cucumber proved immune, and resisted all attempts at infection in the United States.

Quite recently specimens of diseased tomato plants were received at Kew from Waltham Cross. In each case the base of the stem was considerably shrunk, and the cortex destroyed, and studded with numerous minute perithecia, which on examination proved to be identical with the conidial or *Ascochyta* stage of the American melon disease. In some specimens the nodes of the stem were also attacked. Plants attacked as above promptly succumbed, a grower's statement being that they fell over like nine-pins.

Almost simultaneously with the above, a diseased cucumber plant was received from Gloucestershire, which showed the whitish diseased nodal portions of the stem, characteristic of the American melon disease. Numerous minute perithecia, which proved on examination to be those of the *Ascochyta*, were present on the diseased patches.

Cucumber plants attacked by this disease are stated to be quickly killed outright. Experiments conducted at Kew showed that the spores from diseased cucumber plants infect young tomato plants, and that spores from a tomato plant would infect vegetable marrow plants. In both instances the plants infected showed the conidial (*Ascochyta*) stage of the fungus within a fortnight, and in both instances the lesions formed were characteristic.

Both in this country and in the United States the conidial form of fruit is responsible for the rapid extension of the disease.

The simultaneous occurrence of this well-known American disease at two widely separated localities in this country is difficult to explain, as living melon plants are not imported, and the fungus does not attack the fruit.

The result of preventive experiments conducted in this

country is not yet recorded. According to Grossenbacher, spore inoculations conducted in the field were almost complete failures, and it is considered that the very moist, warm environment of the greenhouse is essential for the infection and development of the fungus. Further experiments showed that the spores of the fungus are not killed by exposing infected soil to weathering conditions of winter, nor by fumigation with hydrocyanic gas. It seems that an epidemic may be prevented by spraying thoroughly with Bordeaux mixture before the disease appears, and repeating at intervals, to keep the plants covered with the solution.

An illustrated Leaflet dealing with this disease will be issued shortly.

Investigation during the past two decades has led to a wide appreciation of the fact that very slight differences in the processes of butter-making may lead to very wide differences in the quality and keeping powers of the produce.

**The Influence of
Acidity of Cream on
the Flavour of
Butter.**

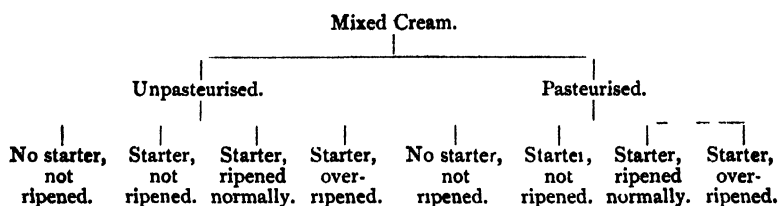
The extent to which acidity has been developed in the cream when churned has long been recognised as an important factor in the production of first-class butter, and where butter is kept in cold storage before being sold, it has a considerable influence on the retention of the flavour of the butter.

During the past three years the Dairy Division of the United States Department of Agriculture has been investigating this question, and a report has lately been issued,* in which it is pointed out that while some authorities have concluded that butter made from sweet cream retains its flavour better than that made from sour cream, the opposite conclusion has been reached by others.

In the course of the inquiry butter was made from both pasteurised and unpasteurised cream of varying degrees of acidity and stored at different temperatures. The method consisted in taking a lot of mixed cream, and pasteurising

* "The Influence of Acidity of Cream on the Flavor of Butter," by L. A. Rogers and C. E. Gray: Bull. 114, Bureau of Animal Industry, U.S. Dept. of Agric., Washington, 1909.

one-half of it. The two lots were then each divided into four and similarly treated, as shown by the following diagram :—



Varying degrees of acidity were thus obtained. The butter made from these lots of cream was packed in 20-lb. tubs and kept in cold storage, two tubs of each lot being stored at temperatures of 32° F., 10° F., and - 10° F.

Two other lots of cream were similarly treated and churned, and the butter was sealed in tin cans, and stored at the same temperatures as the first lot. The different lots of butter were judged at intervals by experts, as regards the flavour and keeping quality.

The conclusions arrived at are summarised as follows :—

Butter frequently undergoes marked changes, even when stored at very low temperatures. These changes are more marked as the acidity of the cream from which the butter is made is increased.

No bacteria were found in the cream or in the butter, which could reasonably be expected to be the cause of the more rapid deterioration of the high-acid butter.

The changes in the high-acid butter were not checked by heating the ripened cream, which shows that they were not brought about by enzymes secreted with or in the cream and carried into the butter.

Marked changes of an undesirable nature were produced in butter by acidifying pasteurised cream with various acids. These changes did not take place all at once, but were of a progressive nature.

The results indicate that the acid developed normally in the cream by the action of the lactic-acid bacteria, or added directly to the cream in the form of pure acid, brings about or assists in bringing about a slow decomposition of one or more of the compounds of which butter is composed.

Butter can be made commercially from sweet pasteurised cream without the addition of a starter. Fresh butter made in this way has a flavour too mild to suit the average dealer, but it changes less during storage than butter made by the ordinary method.

In recent years an attempt has been made, with some success, to introduce into Germany the Danish methods of "milk control." According to an inquiry made by the German Agricultural Society,* there were at the end of 1908, 207 control societies in operation, representing 3,005 members and 88,296 cows, or about 15 members and 425 cows to each society.

**Milk Tests and
Milk Control Societies
in Germany.**

The object of these societies is, briefly, to enable the farmer, by a system of milk-testing, combined with the keeping of careful records, to check the yield of each cow in his herd, with a view to the elimination of those which appear unprofitable. The system adopted is to employ a young man to visit the farms of members at regular intervals and weigh and record the milk yield and other particulars.

These young men are commonly farmers' sons who have had some training at a dairy school, and undertake the work as a means of gaining experience. They receive a small salary (£30-£50), with travelling expenses and free board and lodging at the farms they visit. Their work is generally supervised by some of the officials belonging to a neighbouring breeding society or winter school.

The milk yield of each cow, and its fat content, is ascertained by the tester, or if there is an institution close by where milk testing is done, samples may be sent to it, instead of being tested on the spot. When the animals are stall-fed a record is kept of the amount of food used, and a scale is adopted for adjusting the quantity of food to the milk yield.†

The records of the milk-yield thus obtained are found to be of the greatest assistance in improving the breed of cattle, and

* *Mitt. der Deutschen Landw. Gesellschaft*, 13th March, 1909.

† See "Milk Testing in Denmark," *Journal*, April, 1905, p. 21.

in many cases this may be said to be the main object. The herd-book societies work in conjunction with the control societies, the bulk of the members belonging to both, and the records of the cows are entered in the herd-books. This is to some extent a new development, as when these societies were first instituted in Denmark they aimed more particularly at improving the average milk yield of a herd by telling the farmer what each individual cow was giving, with a view to unsatisfactory animals being weeded out. The information, however, also afforded a basis on which an improved breed of cows could be built up, and this aspect of the matter has resulted in a close connection being formed in recent years, both in Denmark and in Germany, between the societies for milk control and the herd-book societies.

The benefit of records of this kind in the case of pedigree stock was recognised in Germany at a much earlier date in the case of the Allgäuer Herd-book Society, which has carried out systematic milking tests of its pure-bred cows since 1894. In 1907 about 500 cows were being tested in this way. The cost is borne by the Society, which employs several officers for the purpose, who visit each farm once a fortnight and record the milk yield. A sample is also taken, and sent to the experiment station at Memmingen to be tested. The total production and the fat-content thus ascertained are entered in the herd-book, the year's production being reckoned from eleven days after calving till the yield falls below $4\frac{1}{2}$ lb. of milk daily. The milk tester keeps a record for each cow, so that the owner knows exactly the condition of his herd.

The great variation in the laying powers of hens is well known, though the importance to a poultry keeper of breeding from birds which have been proved

Egg Records. to be good layers is probably only beginning to be recognised. The great difference existing, even in the case of selected birds, was shown in the egg-laying competition recently described in this *Journal* (May, 1909, p. 108), where, for example one White Leghorn laid 158 eggs and another only 36 in the course of a year. The only way in which these differences

can be observed is by the use of trap nests, and for the purpose of establishing a good laying strain the trap nest is invaluable. This, however, involves great care and attention, and except as regards a small number of fowls specially kept for breeding purposes, it may perhaps be regarded as inapplicable to the conditions of poultry-keeping on ordinary farms. A good deal of useful information can, however, be obtained by keeping simple records of the eggs produced, and these will be more valuable if the fowls are kept in small flocks. They will serve to direct attention to exceptionally poor results, and may thus enable unsatisfactory hens to be weeded out. In the same way, where several breeds are kept, the difference in egg-laying capacity can be observed. If a sufficient number of such records over a considerable period could be obtained, they would afford a reliable guide to the average laying powers of the different breeds.

An attempt in this direction has recently been made by the Irish Department of Agriculture, who have obtained records for the year 1908 from 125 flocks, representing over 5,000 hens. The general average of all these flocks was 120 eggs per hen per annum. One lot of Barred Plymouth Rocks (varying in number in the course of the year from 20 to 36) gave an average of 201, and there were six lots of different breeds that averaged over 180. On the other hand, there were ten flocks that gave under 80 eggs per hen.

Dividing them according to breeds, the results were as follows:—

Breed.	Average of all the flocks.	Average of best flock.	Average of worst flock.
	Eggs.	Eggs.	Eggs.
White Leghorns . . .	134·6	171·6	69·8
Brown Leghorns . . .	143·6	181·8	113·8
Black Minorcas . . .	122·1	189·0	81·2
Buff Orpingtons . . .	132·8	188·6	86·7
White Orpingtons . . .	122·2	126·5	122·8
White Wyandottes . . .	129·2	171·9	88·0
Faverolles . . .	122·6	165·4	68·0
Barred Plymouth Rocks . . .	109·0	201·1	69·8
Houdans . . .	99·2	134·4	82·7
Light Sussex . . .	97·0	102·3	89·0
Mixed Pure Breeds . . .	135·7	184·8	117·9
Mixed Flocks . . .	117·1	196·3	71·3

The number of hens belonging to the different breeds was small, about 60 per cent. of the total number of hens being of mixed breeds. The difference, however, between the best and worst flocks of the same breed suggests that the breed is not of so much importance as the strain or the individuality of the birds, though allowance must be made for other factors, such as differences in the age of the birds, methods of housing and feeding, &c.

Whatever may be the cause in individual cases, it is certainly a very striking fact that such great variations should occur, and when the existence of such low yields is known, it should not be difficult to raise the standard to something nearer the average.

Complete returns for each lot of hens from which the returns were obtained are given in the *Journal of the Irish Department of Agriculture*, April, 1909; and later returns, giving results for the six winter months, October, 1908, to March 1909, are given in the issue of the *Journal* for July, 1909. The average yield was 42 eggs in the six months, the highest figure being 87 and the lowest 14.

The question of the conditions under which casual labour is employed in agricultural districts for such purposes as hop, fruit, and pea picking has recently been investigated on behalf of the Local Government Board by Dr. Reginald Farrar, one of their medical inspectors, and his first report, dealing chiefly with hop-picking, was referred to in this *Journal* (May, 1907, p. 109). A second report has now been issued on the lodging and accommodation of pea-pickers.

**Accommodation for
Pea-pickers.**

The total area on which peas were grown in Great Britain in 1907 was 166,136 acres, but by far the greater part of the peas grown are reaped, threshed, and harvested in the same way as corn crops, only a small proportion being picked "green" by hand. Until recently no exact record has been kept of the proportion of peas picked green, but the Board of Agriculture have recently made some inquiries into this

matter, from which it appears that the total area on which peas are so picked does not exceed 10,000 or 12,000 acres.

The county in which the largest area is planted with peas is Lincolnshire, in which 23,836 acres were so planted in 1907, but Dr. Farrar ascertained that only in two rural districts, and in these only to a very slight extent, are green peas picked on such a scale as to require the assistance of imported labour to supplement local labour. The few persons so employed are of the vagrant class. Vagrant labour is also employed to some extent for the green-pea harvest in the neighbourhood of Wisbech, Isle of Ely.

Practically the only counties in which the employment of immigrant labour for the green-pea harvest constitutes a problem of serious magnitude are Essex and Worcestershire, the area amounting to 4,700 acres in Essex and 4,100 acres in Worcestershire.*

In these counties the green-pea harvest is gathered to a small extent by local, but principally by immigrant, labourers.

These latter are of different classes: some are casual labourers or persons temporarily unemployed; others are persons habitually leading a vagrant life, either Romanies or English nomads, who work from May to October through a cycle of fruit and vegetable harvests, and in the winter live by hawking, peddling, or sometimes navvying; others are mere tramps, who seldom work, but wander from one casual ward to another, and eke out their livelihood by begging.

It is difficult to determine the exact number of persons engaged in pea-picking in Essex and Worcestershire, but Dr. Farrar estimates that in Worcestershire from 3,000 to 4,000 and in Essex from 4,000 to 5,000 are so employed.

- The wages paid are—in Worcestershire about 5*d.* to 8*d.* per “pot,” equal to about 40 lb., and in Essex 1*s.* to 1*s.* 6*d.* per “bag,” equal to about 80 lb. The rate varies according to the size of the peas. For example, in Essex 1*s.* 6*d.* per “bag” may be paid at the beginning of the season, when the peas are small, but 1*s.* per “bag” as the season advances and

* *Reports to the Local Government Board on Public Health and Medical Subjects.* New Series. No. 11. Price 4*d.*

the peas are larger. The pickers say that they can earn more money in the latter case than in the former.

A moderately good picker can make about 4s. or even more in a day of fourteen hours. The date and duration of the green-pea harvest varies according to the weather and the demand of the market. Generally, it lasts from about the middle of June to the middle of July, but owing to the total want of organisation of the pea-picking industry and the uncertainty as to the date of the commencement of the harvest, large numbers of immigrants invade the districts affected about a fortnight before the peas are ready for picking.

The conditions affecting the lodging of these workers are discussed in Dr. Farrar's report, and he points out that frequently no accommodation whatever is provided by the farmer, that when shelter is provided in tents or in farm buildings, it is generally inadequate and unsatisfactory, and that the conditions of the industry are such as to entail severe hardship and suffering on the pickers, and grave nuisance on the districts which they invade.

Certain circumstances connected with pea-picking, such as the short duration of the harvest and the absence of organisation, make the problem of providing accommodation much more difficult than in the case of either the hop or strawberry crops, and Dr. Farrar thinks it unlikely that material improvement is to be anticipated in the conditions under which pea-pickers work unless their employers are compelled to provide the accommodation necessary for their welfare and comfort.

To insist on proper accommodation being provided cannot, he points out, be regarded as a hardship on the employer or an undue interference with the liberty of trade. The farmer who grows peas is the means of bringing into his district a very large number of persons for whom the existing accommodation of the district is insufficient. This invasion is a very serious strain on the resources of the sanitary, poor law, and police authorities, and, therefore, adds materially to the burden of the rates. It is equitable to demand that he shall use every available means to minimise this inconvenience.

The report also deals with the employment of casual labour

for other vegetable and fruit harvests, and gives an account of the buildings provided for temporary labourers at Toddington, Glos., and also of the arrangements made for fruit picking at Blairgowrie.

SUMMARY OF AGRICULTURAL EXPERIMENTS.

EXPERIMENTS WITH CLOVER AND GRASS.*

Manuring of Grass Land (*Jour. Roy. Agric. Soc.*, Vol. 69, 1909).—Broad Mead was the only field hayed in 1908, manures having been applied in 1901, 1904, and 1906. Botanical separations of the herbage were made. The heaviest crop (2 tons 1½ cwt.) was given by 12 tons farmyard manure, but the herbage contained little of the leguminosæ. Next came the plot dressed with 10 cwt. basic slag and 1 cwt. sulphate of potash, but the only dressing that markedly increased the leguminous herbage was 5 cwt. mineral superphosphate and 1 cwt. sulphate of potash. Lime, 2 tons per acre, gave no increase over the unmanured plot, but the finer condition of the herbage produced was most noticeable. In 1908 the percentage of leguminous herbage was much lower generally than in 1905 and 1907.

Manuring of Grass Land (*Rothamsted Expt. Stat., Annual Report*, 1908).—The weights are given of the crops on the permanent grass plots (53rd year of the experiment), and also the botanical composition of the herbage.

Manuring of Grass Land (*Harper-Adams Agric. Coll., Field Expts.*, 1908).—The effect of continuous manuring of meadow land which is mown each season is being ascertained on a pasture field laid down many years ago. Ten plots have been dressed each year since 1903, and the crops and the net profit, after deducting cost of manures for 1908, are given and compared with former years. The highest net profit (£1 19s. per acre) was given by 3 cwt. superphosphate, and the next (£1 1s. 4d.) by 10 tons farmyard manure every fourth year, with complete artificials in the intervening years. In the summary of the results for the first four years it was shown that superphosphate, alone or in combination, was essential for an increased crop on this land, and this continues to be the case, its effect on the quality of the herbage being very marked.

Experiments on the manuring of meadow hay were also conducted on seven farms in Staffordshire. These trials have now been carried on for from one to ten years, and the results for 1908 and the average for the series of years are given.

Seeding of Temporary Hay (*Harper-Adams Agric. Coll., Field Expts.*,

* The summaries of Agricultural Experiments which have appeared in the present volume have been as follows:—Experiments with Cereals, April, p. 65, and May, p. 150; Experiments with Root Crops, June, p. 239, and July, p. 311; Experiments with Potatoes, July, p. 313, and August, p. 402; Miscellaneous Experiments, August, p. 405, and September, p. 489.

1908).—Four different seeds mixtures were sown, together with a plot each of red clover and rye grass for comparison. The experiment is being repeated.

Manuring of Seeds Hay (Midland Agric. and Dairy Coll., Repts. on Expts., 1907-8).—These trials have now been carried on for five years for the purpose of ascertaining whether this crop can be profitably treated with artificial manures. Plots at a number of farms were dressed with different mixtures of artificials and compared with unmanured plots. The results are considered to show that:—

1. The seeds hay crop can be profitably treated with artificial manures, even in a prolific season, and on good land.
2. It is better to apply a complete dressing—i.e., one containing nitrogen, phosphates, and potash—rather than an incomplete one.
3. Unit for unit the nitrogen contained in the two manures, sulphate of ammonia and nitrate of soda, is of equal value to this crop. The user's choice should, therefore, be in accordance with the cost per unit.
4. In these trials muriate of potash was the only form of potash which gave a profitable return, and then only when applied within the first fourteen days of March.

The following mixture is recommended as giving the best and most profitable yields:—105 lb. muriate of potash (50 lb. potash) applied within the first fourteen days of March, followed by 130 lb. sulphate of ammonia (25 lb. nitrogen), 216 lb. superphosphate (25 lb. phosphoric acid), applied within the first fourteen days of April.

The results of the experiments carried out on similar lines in 1908 are given in Bulletin No. 1, 1908-9.

Manuring of Grass Land (Univ. Coll., Reading, Expts. at the College Farm, 1908).—An acre of old grass land has been divided into ten plots and is treated with different manures, which are repeated annually, to observe the effect of the fertilisers on the quality and quantity of the herbage. In 1907 and 1908 the best average results were obtained with:—(1) 1 cwt. nitrate of soda, 3 cwt. basic slag; (2) 1 cwt. nitrate of soda, 5 cwt. kainit; (3) 5 cwt. basic slag, 3 cwt. kainit. All these did slightly better than 16 loads of dung, but the results obtained from 5 cwt. basic slag alone were slightly inferior.

Laying Down of Permanent Grass Land (Univ. Coll., Reading, Expts. at the College Farm, 1908).—Two series of $\frac{1}{2}$ acre plots have been sown with different seeds mixtures, and the percentage of ground covered by the different species, and the hay crops in 1907 and 1908, are given.

Manuring of Meadow Land (Univ. Coll. of Wales, Rept. on Expts., 1907-8).—An experiment was commenced in 1906 at Waunifor to determine the manurial requirements of meadow land in the district. The land is a medium loam with a good percentage of organic matter, but was much exhausted by preceding crops. The crops obtained on 15 plots in 1906 and 1907 are given.

In 1907 as in 1906 the heaviest yield and the greatest profit per acre were obtained on the complete manure plots. Of the single manures kainit seems to have been the ingredient most required, which has been found to be a common experience in manuring land of this description. The experiment is being continued.

Manuring of Grass Land (Univ. Coll., Reading, Bull. IV.).—These experiments were designed to illustrate the influence of the chief artificial manures when used singly and in combination, and also to determine what is the most efficient and most economical dressing to apply to the grass land of the county. The trials have been made for two or three years at 18 centres, and are being continued. On the average during three years the complete dressing of artificial manures, viz., 1 cwt. nitrate of soda, 5 cwt. basic slag, 2 cwt. kainit, has produced the heaviest crop of hay, 2 tons $1\frac{1}{2}$ cwt.; 16 loads of dung comes next, producing 1 ton 19 cwt. Other plots received single fertilisers, or the above-mentioned mixture with one of the ingredients omitted. Professor Percival observes that "there is no comparison between the quality obtained by the use of dung and that obtained by the use of artificial manures. The herbage on the dung plots is of a coarse low-grade quality, while that on the complete manure plot or the others where slag is used is of superior value, being largely composed of clover and other leguminous plants, along with the finer grasses of better feeding quality." Analyses of the soils on which the experiments are being conducted are given in the report.

Manuring of Grass Land (Cumberland and Westmorland Farm School, Annual Rept., 1907-8).—Trial plots have been manured every third year for eleven years, the last application being in 1905. The yields for 1906 and 1907 were, therefore, dependent on residual manurial matter, proved to be heavy in both years. The plot which received 10 tons farmyard manure gave 11 cwt. per acre more than the unmanured plot, and that which received $\frac{3}{4}$ cwt. nitrate of soda, $1\frac{1}{2}$ cwt. kainit, and 3 cwt. superphosphate, 9 cwt. more than the unmanured plot. For the average of the eleven years these differences were 13 cwt. and 9 cwt. respectively. Basic slag did not give such good results as superphosphate here, though the difference was not great.

Effect of Manuring on the Botanical Composition of Pasture (Journ. South-Eastern Agric. Coll., Wye, No. 17, 1908).—A detailed botanical analysis of the herbage on six plots dressed with different artificials is given. There was no unmanured plot, and no analysis was made before the experiment was begun, so that few conclusions can be drawn, but basic slag is believed greatly to encourage Black Medick and Suckling Clover, while the application of superphosphate, nitrate of soda, or sulphate of potash singly does not have this effect.

Manuring of Grass Land (Expts. at Kineton, Warwickshire, 1909).—Experiments have been carried out here since 1901 by Mr. Ernest Parke, J.P., with the co-operation of Dr. Bernard Dyer.

When this land was first taken over by Mr. Parke it was in very poor condition owing to long-continued neglect as regards manuring. The fields selected in 1901 for these grass experiments had then been down in grass for about ten years. The soil of both fields consisted of clay containing only a small admixture of sand, and may perhaps be best described as "heavy clay loam."

On analysis both soils were found to be very poor in available phosphoric acid. The soil of one of the fields ("Upper Hale") contained a smaller proportion of lime than that of the other ("Five and Three Acres"), and it was accordingly decided to use basic slag as a phosphatic

manure for "Upper Hale" and superphosphate for "Five and Three Acres." Analysis indicated that both soils contained a sufficient quantity of natural potash, but nevertheless portions of the experimental area were marked out for treatment with potash salts. The analytical indications were borne out by the fact that while phosphates have produced a large increase of hay, potash salts have thus far had but a small effect on either of these fields, although in other trials potash salts have proved very valuable in improving both the yield and the composition of the hay.

The results of the first eight years' experiments are summarised below. The natural yield of the land may be seen from the quantity of hay yielded by a portion of each field which has been left continuously unmanured. The yield of the unmanured land is tending to increase slightly but steadily year by year, by reason of the fact that, after hay harvest, the whole of the plots are thrown open to autumn grazing with the rest of the field. Under these conditions the unmanured plots share to some extent the indirect manurial advantage of the consumption by grazing stock of the richer herbage of the manured land. This gradual improvement appears in both fields.

No exact botanical survey has yet been made of the plots, but, speaking in general terms, it may be stated that the unmanured land is conspicuous for the poor, wiry nature of its grass and the abundance of plants which, in a pasture, may be regarded as weeds. On all the manured plots, on the other hand, there is an abundant growth of rich grass. Where phosphates, or phosphates and potash salts, have been continuously applied without nitrogen, the growth of plants of the clover kind is most conspicuous; while on the plots on which nitrate of soda has been continuously used without phosphates or potash (a mode of manuring which on general principles is not to be recommended), the grasses, as distinguished from clovers, are most prominent. The best herbage, however, in which clovers and grasses appear to flourish with equal vigour and luxuriance, is found on the plots on which both phosphates and nitrate are used every year.

FIVE AND THREE ACRES

Manuring per Acre.	Annual Yield of Hay per Acre						Average gain due to Manuring.	
	1908		1909.		Eight years' Average			
	Tons	Cwt	Tons.	Cwt.	Tons	Cwt.	Tons	Cwt.
No Manure	0	10½	0	14	0	10½	—	
Superphosphate (3 cwt)	1	8½	1	15½	1	11½	1	1
Superphosphate as above, with Sulphate of Potash *	1	8½	1	16	1	12½	1	2
Superphosphate as above, with Nitrate of Soda (2 cwt. in 1902, 1903, 1904, and 1905 ; 1½ cwt. in 1906, 1907, 1908 and 1909)	1	14	2	3½	2	1	1	10½
Superphosphate and Nitrate of Soda as above, with Sulphate of Potash *	1	14	2	4	2	2	1	11½
Nitrate of Soda without Phosphates or Potash	1	7	1	9	1	12½	1	2

UPPER HALE FIELD.

(In this field, which is poor in lime compared with the other, Basic Slag is used in place of Superphosphate.)

Yield of Hay per Acre.

Manuring per Acre.	1908. Tons. Cwt.	1909. Tons. Cwt.	Eight years' Average. Tons. Cwt.	Average gain due to Manuring. Tons. Cwt.
No Manure	0 12½	0 15	0 13	—
Basic Slag (8 cwt. in 1902; 5 cwt. in 1903, 1904, 1905, 1906, 1907, 1908 and 1909)...	1 10½	1 18	1 15	1 2
Basic Slag as above with Sulphate of Potash *	1 11½	2 1½	1 17	1 4
Basic Slag as above with Nitrate of Soda (2 cwt. in 1902, 1903, 1904 and 1905; 1½ cwt. in 1906, 1907, 1908 and 1909) ...	1 15½	2 6	2 4	1 11
Basic Slag and Nitrate of Soda as above with Sulphate of Potash *	1 16½	2 7	2 5	1 12
Nitrate of Soda without Phosphates or Potash	1 8½	1 15½	1 15½	1 2½

* 2 cwt. Sulphate of Potash per acre in 1902 and 1 cwt. per acre in 1905, 1906, 1907, 1908 and 1909. No Sulphate of Potash in 1903 and 1904.

Manuring of Grass Land (Agric. Students' Gaz., Cirencester, Aug., 1909).—Trials of manures have been conducted on 20 plots during the last eighteen years, the results in 1909 being given in this publication. Nitrate of lime and calcium cyanamide were also compared by applying them in April to a field which had been manured with farmyard manure and a light dressing of superphosphate, the dressings containing the same amount of nitrogen as 2 cwt. of nitrate of soda. Calcium cyanamide, though not generally recommended as a top dressing, gave an increase in crop of 6 cwt., and nitrate of lime of 9 cwt., as compared with a plot which received no further manure.

Seeds Mixtures for Permanent Pasture (Univ. Coll. of N. Wales, Agric. Dept., Bull. 7, 1908).—Four different mixtures of grass and clover seeds were sown at nine centres in 1906, and the plots were mown in 1907 and 1908. In both years the greatest weight of hay on the average was given by a mixture recommended by Mr. R. H. Elliott, of Clifton Park, Kelso. This contained no Perennial Ryegrass, but a larger number than usual of deep-rooting pasture plants, including Burnet, Chicory, and Kidney Vetch. It was, however, the most expensive and contained the greatest weight of seeds. A mixture containing more Ryegrass and Red Clover than the others, which approaches nearly to those usually sown by farmers, gave the next heaviest crop, but has not produced so satisfactory a pasture.

The reports received from the Crop Estimators of the Board on September 15th generally comment on the hindrance to harvesting operations caused by the wet weather which

Report on Crop Prospects in September. This has, however, been more serious in the east and south, and corn crops have consequently suffered more on this side of England than in the west, or in

Scotland, where the weather appears to have been much less broken and even favourable. Wheat has somewhat fallen off, particularly in the east and south; elsewhere it has on the whole about maintained, or even a little improved its promise. Barley quite maintains its high position of a month ago, and is now decidedly the corn crop of the year. Oats are regarded as having somewhat improved, although still not a good crop, except in Scotland, where they seem over average.

Potatoes have decidedly fallen off during the month, owing to the general spread of disease, which is very prevalent; and growers are now looking for a fairly abundant yield at best instead of the very heavy crops which appeared probable earlier in the season. Roots have improved during the month, and promise to be much above average, although a general lack of sunshine is reported to have been a drawback, particularly in the case of mangolds.

In England a plentiful growth of grass is generally reported, and second cuts of clover have mostly been good; in Scotland, both grass and second cuts seem rather less satisfactory.

Reports as to apples and pears vary somewhat; generally the crop would appear to be moderate, and the fruit is of small size. Plums are stated to be light. The fruit crop seems generally better in the northern districts.

Hop-picking is sufficiently advanced to allow of a closer estimate of the production than has hitherto been possible. Generally, the yield is bad, except where constant washing has been carried out; in Kent frequent mention is made of 6 cwt. or more as a probable average per acre, though many localities will show less than this; while in the west much poorer yields are indicated.

Labour is generally reported as sufficient for requirements; though harvesting has, of course, proved a troublesome and expensive operation in the south and east.

Summarising the reports, and representing an average yield by 100, the appearance of the crops in mid-September indicated yields for Great Britain which may be represented by the following percentages:—Wheat, 104; barley, 105; oats, 98; potatoes, 102; roots, 105; hay and grass, 95.

Hop Crop.—In *Kent* the estimators agree that the crop is coming down even lighter in bulk than anticipated. In the *Weald* one estimator describes the crop as the shortest since 1882; over a considerable area 7 cwt. per acre is mentioned as a probable average by another; the quality, however, is good. In *East Kent*, again, 7 cwt. is about the yield expected over one large district. Hops are especially bad where they have not been continually washed. In the *Mid-Kent* area reports range in different parishes from 1 to 15 or 16 cwt. per acre; while another estimator, after allowing for the area unpicked, states that the yield in his district cannot be more than 6 cwt. per acre. In *Surrey* such growers as have almost continually washed have, to a considerable extent, saved their crop, but at great cost; those who did not wash have almost a total failure. The *Farnham* district will probably return about 5 cwt. per acre, but reports from the different parishes vary very considerably. As regards *Sussex*, the bine is generally very poor and the hops backward and seriously affected by wet and cold. Where

the hops have been carefully cultivated throughout, and have withstood the weather, yield and quality may be average, but the majority of the hops in the district will be far below the average, and many acres cannot be worth picking. Where hops have been well cultivated and continually washed a fair crop may be obtained in *Hampshire*, but elsewhere in the county the crop has practically failed. One reporter estimates the yield at 3 to 4 cwt. per acre in his district. In *Hereford* the crop is described by one estimator as the worst since 1882, and in many parishes will not be more than 2 cwt. per acre. Another estimator quotes 4 cwt. per acre as a probable average in his neighbourhood, and adds that quality leaves nothing to be desired. In *Worcestershire* about one-third of an average crop is expected to be obtained. The quality is reported good.

THE weather during the month of September was, as a whole, unsatisfactory. During the *first* week (Aug. 29 to Sept. 4) the conditions were changeable and showery, warmth being

**Notes on the Weather
and Crops in
September.**

"deficient," in Scotland W., England N.W., S.W., and N.E., and "very deficient" in Scotland E., England E. and S.E. and the Midlands. Bright sunshine was less than the average over the major portion of the country, but the deficiency was not large. With this week the meteorological summer came to an end. It is worth recording that in the thirteen weeks of summer no fewer than ten were below the average as regards warmth in England S.E., and only two above. For England E. the figures were nine below and two above, and for Scotland E. and England N.W. they were eight below and only one above. In England N.E. and S.W., and in the Midlands, they were seven below and only two above.

The autumn began in a similar dreary fashion. Warmth was "deficient" for the *second* week in September everywhere except in England N.W. and S.W., where it was "very deficient." Rainfall was frequent, though not "heavy," except in Scotland E. and England S.E. Sunshine was "moderate." During the *third* week the weather was slightly better, but warmth was "deficient" everywhere except in England E. and the Midlands. Sunshine in England E. and S.E. was "scanty," and in England N.E. and the Midlands "very scanty." In England E. rainfall was "heavy." On the 17th, 1.41 in. of rain fell at Wisley, and 1.02 in. at Oxford. At the latter station 0.5 in. was registered within 15 minutes. In the *fourth* week, the weather was at first fair and dry over England, but afterwards became unsettled over the United Kingdom generally. A magnetic storm of considerable intensity occurred on the 25th. Except as regards sunshine, which was "scanty" in most parts of the Eastern section and in Scotland W., there was little variation from the normal. Thunderstorms occurred on the 23rd, with falls of more than an inch of rain.

The state of the weather is reflected in the statements made by some of the correspondents who have written to the Board. One, from Newbury, says: "A disastrous month for the harvest. Rain was needed, but it came at a most inopportune time. Much corn is stacked in wretched condition. A great deal cannot be threshed until drying winds and frost have penetrated the stacks. Quality of all samples

brought to market hitherto extremely variable. Grass and ~~wee~~ of all sorts most abundant." Another from the same district writes: "The past month has been very unfavourable for harvest work, for although a considerable quantity of corn has been got together it has been stacked in bad condition. There is still a large proportion of oats and some barley in the fields at the present time, and great damage has been done to these crops. Plums plentiful but damaged by rain. Apples about half a crop, and many falling from the trees through wet weather. Potatoes diseased: otherwise would yield well." A correspondent in Kent writes: "Owing to rain almost every day the finish of the harvest was constantly delayed, especially in the case of oats. Some corn is still in the fields. Hop-picking was constantly delayed, but the crop was fairly good where well cared for, but bad where neglected. Mangolds, swedes, and turnips are good crops. Apples are unusually small and colour is lacking. Fruit generally has less flavour than usual. Damsons good crop. Pears fair." A correspondent writing from Midlothian reports a very similar state of things, with the addition that the sparrows have caused great depredations.

Germany.—The Imperial Statistical Bureau estimates the numerical condition of the potato crop in the middle of September as 25, compared with 23 in August, and 26 in September, 1908 and 1907. It is stated that the crop, which was then being harvested, is not altogether satisfactory. The haulm had commonly died down too early, and this, in conjunction with leaf disease, hindered the ripening of the tubers, which in many cases have remained small, and have suffered nearly everywhere from wet weather.

Notes on Crop Prospects Abroad.

Austria.—According to the official Austrian crop report for the middle of September, the harvest of the winter cereals was then practically finished. Wheat is medium to good, barley mostly good, and oats good. Maize is expected to give a barely medium to average crop at the best.

France.—In the *Journal Officiel* of September 28th, the French Ministry of Agriculture gives the area of wheat sown as 16,229,000 acres, compared with 16,214,000 in 1908. The production is put at 345,554,000 bushels, compared with 307,944,000 bushels in 1908.

Norway.—A report issued by the Minister of Agriculture, based on reports up to the beginning of September, states that, owing to cold weather and constant rain, the harvest prospects are in certain districts unfavourable.

Canada.—The report of the Census and Statistics Bureau for September gives the percentage condition of the crops on August 31st as follows:—Spring wheat, 84'30; oats, 84'89; barley, 83'54; and pasture, 76'24.

For the whole of Canada the production of wheat is estimated at 168,386,000 bushels, or 21'73 bushels per acre, compared with 124,690,000 bushels in 1908. Oats, with an average yield of 38'15 bushels, gives an aggregate of 354,919,000 bushels, and barley, with an average of 30'55 bushels, gives an aggregate of 56,975,000 bushels. At the same date last year the estimate was 269,944,000 bushels for oats, and 49,488,000 bushels for barley.

Hop Crop of the World.—The third report of Messrs. John Barth and Son, of Nuremberg, dated September 21st, gives a preliminary estimate of the hop crop in 1909 as 962,000 cwt., compared with 1,990,000 cwt. in 1908 and 1,882,000 cwt. in 1907. This appears to be the smallest crop since 1882, when it was 866,000 cwt. Bavarian and Bohemian hops are stated to be of superior quality. The estimate for the various countries is as follows :—

	1908. Thousands of cwt	1909. Thousands of cwt.
Germany	526	157
Austria-Hungary .. .	353	168
France	78	37
Belgium and Holland	76	35
Russia	74	69
England	466	196
United States	403	290
Australia	14	10
	1,990	962

United States.—The report on the condition of the crops on October 1st issued by the United States Department of Agriculture gives the condition of maize as 73.8, compared with 74.6 on September 1st last. The preliminary estimate of the yield of spring wheat is 291,848,000 bus. or 15.9 bus. per acre, compared with 13.2 bus. per acre last year. The yield of winter wheat is put at 432,920,000 bus., so that the total wheat crop in 1909 is expected to be 724,768,000 bus., compared with 664,602,000 bus. in 1908. The preliminary estimate of the yield of oats is 983,618,000 bus., and of barley 164,636,000 bus., against 807,156,000 bus. and 166,756,000 bus. last year. The harvest of wheat and oats is thus expected to be considerably above that of 1908, which year was also more favourable than 1907.

THE Board of Agriculture and Fisheries have been furnished by the Board of Trade, with the following report, based on returns from correspondents in various districts, on the demand for agricultural labour in September.

**Agricultural Labour
in England
during September.**

There was a good deal of loss of time among day labourers and men at piecework in September owing to wet weather, which considerably interfered with harvest work in most parts of the country, many farmers in districts usually early having corn still in the fields at the end of the month. When fine, the harvest, hoeing, potato lifting, &c., caused a good demand for day labourers, but the supply was generally ample.

Northern Counties.—Employment was generally regular in *Northumberland, Cumberland, and Westmorland*, but rain interrupted the corn harvest at the end of the month, and extra labourers lost time in consequence; there was a sufficient supply of these men. The supply of and demand for labour were generally about equal in *Lancashire*. In *Yorkshire* the corn harvest and potato lifting caused a fairly good demand for extra labour, but there was generally a plentiful supply; in most districts some time was lost by harvest labourers on piecework on account of rain.

Midland Counties.—Correspondents in both *Cheshire* and *Derbyshire* report some irregularity of employment, and in the Hayfield Union in *Derbyshire* a surplus of labour is mentioned. The demand for extra labourers in *Nottinghamshire* was largely intermittent on account of wet weather. In *Leicestershire* the corn harvest kept most men busy when the weather was fine, but rain prevented work on several days. Most day labourers lost some time through rain in *Staffordshire* and *Shropshire*, while generally there was an ample supply of this class of labour, two correspondents in *Staffordshire* mentioning a surplus. The corn harvest, fruit picking, and potato lifting caused a fairly good demand for extra labourers in *Worcestershire*, but there was much loss of time in some districts on account of wet weather. There was similar irregularity of employment in *Warwickshire*, where, in fine weather, the supply of and demand for labour were fairly equal. Day labourers were also reported as much affected by the weather in *Northamptonshire*, *Oxfordshire*, and *Buckinghamshire*, harvesting operations suffering frequent interruption in many districts. Some excess in the supply of extra labourers was reported from *Hertfordshire* and *Bedfordshire*, and irregularity of work for these men was further increased by the wet weather.

Eastern Counties.—The corn harvest generally provided plenty of work in fine weather for extra labourers in *Huntingdonshire* and *Cambridgeshire*, but there was much loss of time through wet weather in these counties. A correspondent in the St. Ives Union mentions some scarcity of men to meet the extra work on laid crops. The harvest was much interrupted by rain in *Lincolnshire*, and many men lost time in consequence; the supply of labour was generally sufficient, but a correspondent in the Brigg Union mentions a difficulty in securing Irish labourers for potato lifting, on account of the demand for the corn harvest. There was a good demand for extra labourers in *Norfolk* and *Suffolk*, when the weather permitted of the corn harvest being proceeded with, and some difficulty in getting men for work other than harvest was reported; in these counties, however, and in *Essex* rain seriously hindered harvest work, and many labourers who had contracted to work for a fixed sum during the harvest period suffered in consequence, although in a number of cases farmers gave out other work at ordinary daily wages or by the piece when it was impossible to proceed with the harvest.

Southern and South-Western Counties.—Hop-picking and the corn harvest provided a fair amount of work for extra labourers in *Kent*, but in several districts the demand was only moderate, while the supply was generally abundant; the corn harvest was much delayed by bad weather, and some corn was still uncut at the end of the month. The weather also caused much interruption to harvest work in *Surrey*. In *Sussex* and *Hampshire* the corn harvest, hoeing roots, &c., provided an intermittent demand for extra labourers, but the supply was well up to requirements. Day labourers in *Berkshire* and *Wiltshire* had much irregularity of employment on account of wet weather, and in several districts in *Wiltshire* some surplus of labour was reported. There was some interruption to out-door work in *Dorset* and *Somerset*, but generally not many men in these counties were reported as in irregular work. Fruit and hop-picking, and the corn harvest, provided

fairly regular employment in *Herefordshire*, and the supply of and demand for labour were about equal. Occasional loss of time through rain was reported from *Gloucestershire*, where there was a plentiful supply of extra labourers, but some scarcity of cowmen and carters. Employment was fairly full and regular in *Devonshire* and *Cornwall*; there was a scarcity of men for permanent situations in *Cornwall*.

THE CORN MARKETS IN SEPTEMBER.

C. KAINS-JACKSON.

Despite a singularly dragging and difficult harvest, no symptoms of anxiety as to the supply of grain were shown on the markets during September. Large imports of wheat were received weekly from India and other quarters, while good imports of Russian barley, Argentine maize, and Russian and Argentine oats assured the great cities of their supplies, and in the rural districts the poor condition of the new crop deliveries made it necessary to accept substantially reduced prices in order to effect sales.

Wheat.—In a large majority of cases the prices of September show a decline from those of August. This is the experience of any adequate succession of years, whether we look to the decade or the quarter or half century. The August averages nearly always include sales of fine and dry old wheat, and this year the August sales were almost exclusively of old corn, scarcely any new being available until September. Thus a decline in British wheat from 42s. 4d. to 34s. 7d. per qr. represents the change from a scanty supply of specially fit milling corn to materially increased deliveries of grain largely damp and weather-stained, and, even in the best samples, on the soft side.

It is not always safe to generalise from local averages, but one may feel fairly confident that the 34s. 9d. averaged at Salisbury late in September represented sales of new wheat secured in the good weather period, August 3rd–17th, while the 31s. 3d. accepted at Peterborough was the depressed price resulting from threshings of later and less well-secured grain. The price of one sort of foreign wheat has been enhanced through extreme scarcity. This is Manitoba. All four grades rose steadily as the month wore on, and closed at 48s., 47s., 46s., and 45s. respectively. Millers could foresee that the English new wheat would require an unusually large admixture of the stronger imported sorts, and they had quietly bought up the Manitoba, so that the dearth of this desirable type soon became notable. These remarks refer of course to the 1908 yield; the 1909 crop is only now beginning to be threshed. It is offered for late October and early November shipment at 37s. to 40s. according to grade. The other types of foreign wheat show a marked decline on the month. American new crop winter wheat, scarce at first, became a market feature by Michaelmas, and was on sale for 38s. per qr. at the leading centres. Russia reduced her prices sixpence weekly from the last week of August, and September closed with 2s. 6d. total decline on five weeks; 40s. was accepted for grain originally quoted at 42s. 6d. As this wheat weighs 496 lb. against the American weight of 480 lb., it was a very

fair bargain, and commanded a good retail sale. Australian wheat has been in moderate request, the 43s. made at the end of the month showing about 1s. 6d. net decline. New Zealand wheat arrivals have not shown the quality of some years, and hardly exceed a 40s. quotation. Argentine wheat is now getting scarce, but it had fallen from 44s. to 42s. by the end of the month. The arrivals of Indian wheat have been liberal and sustained. While the finest white sorts shipped at Bombay have been commanding 41s. per 496 lb., the Calcutta shipments have usually been on sale at a level 40s., and Kurrachee wheat has been obtainable for 39s. per qr. These prices for imported wheat do not depress home-grown grain, for the cheapest Kurrachee is about a shilling dearer than the best samples of the English new harvest.

The shipments of wheat for September were 970,000 qrs. from North America, 110,000 qrs. from South America, 2,046,000 qrs. from Russia, 430,000 qrs. from Roumania, 150,000 qrs. from India, and 86,000 qrs. from Australasia. The new crops of Russia and North America were well in motion, Russian exports showing over a million quarters increase on August. The Indian surplus, on the other hand, looks as if it were becoming exhausted three months sooner than the trade had anticipated. The drop from 880,000 qrs. shipped in August, to the very moderate September total, is quite an event of the month. It should be said that some good judges of market movements believe that India has still a considerable surplus, but will not compete in selling it, with the first rush of new Russian and American crop exports. As regards total supplies of breadstuffs during September, it is generally agreed that they were about half a million quarters in excess of requirements. Stocks, however, on September 1st were much below the average, so that the replenishment thus far accomplished is very moderate. Another circumstance to be taken into account is that the supply on passage fell during the month from 2,005,600 to 1,600,000 qrs.

Flour.—Important changes have taken place in the prices asked for flour. The confectionery trade welcomes a decline in Hungarian from 52s. to 49s. per sack, and in London top-price grade the reduction from 39s. to 35s. is even more marked. The price of Town Households on the last day of the month was a level thirty shillings for cash, and at this very moderate price a good retail trade was passing. The price of country flour ranges from 28s. to 31s. for the chief types. American flour, which at the end of August was quoted at 34s. 9d. for best Minneapolis, 31s. 9d. for ordinary Minnesota First, and 29s. 6d. for Kansas ordinary, prompt shipment, was at the end of September obtainable on spot in London, Liverpool, and Glasgow for the same terms. Australian was at 33s., and there were various qualities from France and Belgium offering at 26s. to 32s. according to the character of the sample. American shipments for September amounted to 442,000 sacks.

Barley.—The average price of British barley for September was 26s. 4d., which was 4d. above the mean value for September, 1908, and 1s. 2d. advance from August. In the last week of the month 28s. 6d. was averaged at Canterbury, 28s. 4d. at Nottingham, and 28s. to 28s. 3d. at several markets. Home-grown barley, therefore, cannot be said to have participated in the general weakness of the September markets. Cheap feeding barley from Russia has been in a different

position, and has fallen to 20s. 6d. per quarter on spot, and 5s. per cental to buyers of whole cargoes on passage. The number of these has increased, and they stood on the 30th for some 390,000 qrs. of feeding barley. Of 448 lb. "brewing barley" 120,000 qrs. were on passage from California, 40,000 qrs. from Anatolia, and 20,000 qrs. from Chili. Sound malting barley is sure of a good demand in October and November, and "brewing barley," the 448 lb. type just below "malting" grade, is also likely to have a steady sale. The autumn barley trade, however, is unusually late this season in making a start. Shipments for September were 2,050,000 qrs. from Russia, 75,000 qrs. from America, and 220,000 qrs. from Roumania.

Oats.—New winter oats were welcome and secured a ready sale. This has happened for some successive Septembers, and suggests that the area sown might sustain some increase without the market for early ripened oats being depressed by over-supply. The new crop of ordinary spring-sown oats has come into effective supply very late this season. Prices, considering condition, are fair. The grower should note the decline in the area sown; the total supply will needs be less to this extent, and the flood of foreign oats affects the British market for home produce very little. If the farmer cannot grow oats which exceed 304 lb. in average weight, the cultivation of other crops is indicated. But over 80 per cent. of oats imported do not exceed 304 lb. to the quarter, and these inferior articles in no way influence values for oats from 312 lb. to 344 lb. weight. Shipments for September were 21,000 qrs. from Argentina, 497,000 qrs. from Russia, and 15,000 qrs. from South Africa. The shipment of oats from the British colonies of the Cape, Natal, and Rhodesia is an auspicious sign of a developing agriculture under the British flag.

Maize.—At the end of August fair average quality maize was tentatively averaged in this survey at 26s.; on September 29th the average of five types quoted at Mark Lane was 25s. 6d. per qr. The fall has been mainly in Russian sorts. Demand has been fair, but the shadow of America's new crop is over the trade and value continues difficult to maintain. Shipments for September were 663,000 qrs. from North America, 270,000 qrs. from South America, 158,000 qrs. from Russia, and 431,000 qrs. from Roumania, Bulgaria, and European Turkey. There were also some minor shipments from South Africa and from Burma. On the 30th there were 910,000 qrs. on passage, which is above the average.

Pulse.—An extraordinary demand for tares for autumn sowing sprang up about the 15th and lasted till the close of the month, by which date it was mostly satisfied. Owing to this particular variety of tares being always within a small compass and an unusually large proportion of the supply being below seeding quality, prices rose within the fourteen days from 4s. to 8s. per bushel, and a few quarters changed hands at a level 100s. per 532 lb., that weight being expected in seeding quality. It should be noted that the agricultural returns show an increased cultivation of tares. Beans and peas have been a quiet, uneventful trade.

Oilseeds.—Perhaps the most salient feature of the month was the opening of a trade in linseed between London and Manitoba. The

price at which this progressive section of the Canadian Dominion is offering linseed enables it to be sold on Mark Lane at 48s. per 416 lb. Considerable increase in Indian rapeseed shipments, as compared with last year, is reported. Cottonseed continues to fetch about 8s. per cwt. for the finest Egyptian.

Farm Seeds.—Red cloverseed is decidedly dearer on the month, at the close of which 70s. was paid for best English, 64s. for imported. A less favourable feature is the frequency with which poor seed at 36s. to 38s. only is offered. Fine Alsike makes 88s., good ordinary 76s., while cowgrass has commanded 72s., Lucerne 78s., and early trifolium 50s.; all these prices are per cwt.

Minor Staples.—Canaryseed is rather cheaper on the month, and commands an improved sale at 50s. per 464 lb. for Argentine and Turkish descriptions. Carraways are a useful and safe appetiser for stock, and fetch 34s. per cwt. We do not seem to secure as much dari as the market could use. Burma has entered the field with some consignments at 26s. to 27s. per 480 lb., but the prime claim of dari as a crop is for growth in those subtropical regions where rainfall is too poor for cereals. It will grow, we are told, with a yearly rainfall of twelve inches, and there are large areas in Africa and Australia that might produce this serviceable and appreciated food.

THE LIVE AND DEAD MEAT TRADE IN SEPTEMBER.

A. T. MATTHEWS.

Fat Cattle.—There was a tendency to weakness in the trade for fat cattle throughout the month, and a gradual but not very serious decline in values. It is very usual, as autumn approaches, to find the quality of the animals coming to market beginning to deteriorate, and lower quotations are often more the result of loss of condition than any real falling off in values for equal quality. The extremely wide range of quotations for Shorthorns of "first quality" in the September official reports is very suggestive on this point, showing as they did a difference of over 1d. per lb. between the highest and lowest in the third week. Ipswich stands almost alone at this season of the year as a market where prime stall-fed cattle are to be found, and in consequence the top price there was no less than 1s. 2d. per stone above the average of English markets.

Supplies were moderate in the first week, many reports speaking of "a small proportion of first quality," and the average price of Shorthorns in 23 English markets was 8s. 2½d. per stone for first, and 7s. 5d. for second quality. Herefords in the same week were only quoted in four markets, their average being 8s. 5½d. and 7s. 6½d., that of Devons being 8s. 5½d. and 7s. 8d., Welsh Runts 7s. 11½d. and 7s. 3d., and Scots 8s. 2½d. and 7s. 7d. In London, on the 6th, the supply was too large for the demand, and prices gave way ½d. per lb., but

altogether the cattle trade throughout the country opened quiet and rather featureless.

Several markets were quoted a little lower the second week, amongst them being such important ones as Hull, Liverpool, Norwich, Preston, Wellington, and York. On the other hand, a few were dearer, especially for first quality, and thus the average price of Shorthorns in 22 markets was only $\frac{1}{2}$ d. per stone lower for first quality. The Hereford average improved by $\frac{1}{2}$ d. per stone in the second week, but Devons declined to the extent of over $1\frac{1}{2}$ d. Welsh Runts, which always come out better as the grazing season advances, were quoted $2\frac{1}{2}$ d. per stone dearer, and Polled Scots over 1d. dearer. These fluctuations in the various breeds are given here, not with any intention of showing their comparative merit, but merely as emphasising the curious differences in local markets, for all these varieties are more or less local, except the Shorthorn. London at this period last year was quoting Shorthorns lower than almost any other market, but now it is well up to the average, and, as its supplies are drawn from widely separated districts, this may be taken as pointing to a better grazing season this summer than in 1908.

The third week brought a continued and more clearly defined fall in prices. That in Shorthorns was small, only amounting, on the average, to $\frac{1}{2}$ d. per stone for first, and 1d. for second, quality, but that on all other breeds was somewhat more. Scotland is not included in this statement, for Dundee, Inverness, Elgin, Perth, and Stirling all reported an improved trade, and some very high prices were quoted per live cwt., Glasgow touching 42s. 6d., and Perth 45s., for some fine Aberdeen-Angus bullocks.

The last Monday's market of the month at Islington was well supplied with 1,230 fat cattle, Shorthorns, Herefords, and Welsh being in about equal numbers, and the average quality was far better than that of the supplies of a year ago. It was a slow trade, and $7\frac{1}{2}$ d. per lb. was the top price for cattle of any breed. For Shorthorns $6\frac{1}{2}$ d. was rather exceptional, many more being sold at $6\frac{1}{4}$ d. On the corresponding day last year the top price of this breed was $6\frac{1}{4}$ d. Fat cows were exceptionally slow of sale, owing, it was said, chiefly to the heavy arrivals of Canadian "Ranchers," which specially compete with this class of beef.

Veal Calves.—The trade for fat calves was, on the whole, quiet and without special feature, commencing with an average of 8d per lb. for first, and 7d. for second quality in 26 markets in Great Britain. Prices varied extremely in different parts of England. Quotations at Ashford were $9\frac{1}{2}$ d. per lb., and 9d. at Chichester, while at Bristol, Derby, and Shrewsbury the highest price was 7d. The average in the succeeding weeks only declined $\frac{1}{2}$ d. per lb.

Fat Sheep.—It was generally supposed that the lowest possible values for British sheep had been touched in August, but September witnessed a yet lower level. As indicated by the preliminary statement of the Agricultural Returns, nearly a quarter of a million sheep, which, in the ordinary course, would have been sold at the close of the turnip season, were still on hand at the end of June, and these have since been a dead weight on the market, preventing any improvement in

prices. The first market at Islington on the 6th was much depressed, the more so from the rough character of the supplies, which consisted almost entirely of heavy wether sheep from Ireland, Kent, Lincoln, &c., while the proportion of neat, small sheep suitable for the London trade was very insignificant. A clearance was impossible, and the nominal decline of $\frac{1}{4}d.$ per lb. would have had to be much larger to force sales. Some other markets during the week were nearly as bad, yet the average for first quality Downs in 17 markets was a fraction over $7\frac{1}{4}d.$ per lb., and $6\frac{1}{4}d.$ for second, practically the same quotations as those of the last week in August, while the average for Longwools was quite unchanged. The only places in England where 8d. per lb. was reached were Chichester and Dorchester, prime Sussex Downs at the former being quoted at $8\frac{1}{4}d.$ At the second market at Islington on the 13th the price for prime Downs fell to 7d. per lb., and the general average only exceeded it by a small fraction, showing a slight further decline, while descriptive reports of the markets were of a still more gloomy character.

In the third week there were again no signs of improvement. At Liverpool, Ipswich, and Carlisle there was an upward tendency, most of the markets being reported unchanged or with lower values. For the first time in the course of the existing depression, first quality Downs only averaged 7d. per lb. in the English markets, second quality remaining at $6\frac{1}{4}d.$, and Longwools at $6\frac{1}{4}d.$ and $5\frac{3}{4}d.$ per lb. Fat ewes were extremely unsaleable everywhere, and $4\frac{1}{2}d.$ per lb. was quite a frequent quotation. It should be clearly understood that the above figures are derived from estimated weights with the offal given in. The latest reports show that the trade maintained its dragging character to the end of the month, though London and Norwich, without claiming anything like a general improvement, were certainly no worse, and both reported a little better demand and firmer values for the prime small-weighted sheep on offer. It may be worth mentioning here that at the Metropolitan Cattle Markets all through September many hundreds of coarse, heavy sheep, failing to find direct buyers, were slaughtered and sold for what they would fetch in the dead-meat market. Reviewing the net results of the month's trading, we find that prime sheep lost about $\frac{1}{4}d.$ per lb. of their value during its course, but that second quality about held their own.

Fat Lambs.—The trade for fat lambs was no better, relatively, than that for mutton, but there was perhaps a little more inquiry for prime small lambs on account of scarcity. Average prices, however, were lower on the month by about $\frac{1}{4}d.$ per lb., finishing at $7\frac{1}{2}d.$ for first, and $6\frac{1}{4}d.$ for second quality. Twenty British markets continued to report business in lambs as distinct from sheep. The price was very uniform, and in the third week only three markets reported up to 8d. per lb.

Fat Pigs.—The demand for fat pigs continued good, and the average of 30 markets held in the first week was 7s. 3d. per stone of 14 lb. for small bacon pigs, and 6s. $8\frac{1}{4}d.$ for those of heavier weight. There was a rather wide difference in values, which ranged from 6s. 6d. at Dundee, to 8s. 2d. at Chichester. In the second week there was an advance of $\frac{1}{4}d.$ on both first and second qualities. The following week small

pigs advanced $\frac{1}{2}d.$, but medium weights went up $1d.$ per stone, and the market remained firm to the close.

Carcass Beef.—The fluctuations of the month in British beef have been small, trade being fairly steady throughout. The London Central Market may be taken with some confidence as reflecting the condition of the carcass trade of the country, and prices in the first week stood there at $7\frac{1}{2}d.$ to $7\frac{3}{4}d.$ per lb. for Scotch short sides, $6\frac{1}{2}d.$ to $6\frac{3}{4}d.$ for whole or "long" sides, and $5\frac{1}{2}d.$ to $5\frac{3}{4}d.$ for English. Port killed was then fetching $5\frac{1}{2}d.$ to $6d.$, whether killed at Deptford or Birkenhead. Chilled beef maintained to the full its reputation for those great and sudden fluctuations of value for which it is difficult to account, especially as regards the supply from Argentina. In the course of the first week it fell from $6d.$ to $5d.$ per lb. for hind-quarters, and another $\frac{1}{2}d.$ in the second week, recovering $\frac{1}{4}d.$ in the third week. United States chilled, continuing in small supply, was steadier in value, starting at $6\frac{1}{2}d.$ for hind-quarters, and $4\frac{1}{2}d.$ for fore-quarters for best quality, or an average of about $5\frac{1}{2}d.$ for the whole side. In the third week, hind-quarters advanced $\frac{1}{2}d.$ per lb., but as Canadian "Ranchers" came more freely to hand, there was a fall of fully $\frac{1}{4}d.$ per lb. in the last week. Frozen beef was offered very freely, and prices were easier than in August.

The arrival of Canadian grass-fed beef usually lowers the average value of port killed in our markets, and as the month advanced, the quotations changed positions with those of English sides. Scotch sides at Smithfield are nearly always higher than Deptford killed by $\frac{1}{2}d.$ to $\frac{3}{4}d.$ per lb., but, as a rule, English are cheaper. On the 22nd English was $\frac{1}{2}d.$, and Scotch $1d.$, per lb. dearer than Deptford. As before pointed out, the English beef sold at Smithfield is small in quantity, and its quality is not fairly representative of the best quality produced. This will be seen by comparing the quotations of Scotch and English sides, the former frequently being the higher by $\frac{1}{2}d.$ per lb., but it is not claimed that there is all that difference in quality between, say, a well-fed Norfolk Shorthorn and the best Scotch, to say nothing of a really fine Hereford or Devon. The last quotations to hand were $6\frac{1}{2}d.$ per lb. for prime Scotch, and $5\frac{3}{4}d.$ for such English as there was on offer.

Veal.—The trade for veal was very quiet in London throughout the month, but remained fairly firm in value till the end of the third week at $6\frac{1}{2}d.$ per lb. for best quality, a small quantity of Dutch frequently fetching more money. About the 23rd the demand was very poor, prices receding $\frac{1}{2}d.$ per lb., and very good English veal was sold at $5\frac{1}{2}d.$ The following were the prices of best English veal at five English markets during the third week: Birmingham, 58s. 4d.; Leeds, 65s. 4d.; Liverpool, 67s. 8d.; London, 56s.; Manchester, 63s. per cwt.

Carcass Mutton.—In view of the state of trade in the live-stock markets, it is needless to say that carcass mutton was at a discount. The price of live sheep was low, but that of mutton in the dead-meat market was relatively lower still. The extreme top price of prime Scotch varied from $6\frac{1}{2}d.$ to $6\frac{3}{4}d.$ per lb., and the best English never exceeded $6d.$, while capital 80-lb. wether carcasses from the West of England were offering freely at $5d.$ per lb. Dutch fresh killed com-

peted keenly in London, and the price of Dutch "sheep" was about $\frac{1}{2}$ d. per lb. less. Dutch "lambs" on offer would, however, be more correctly described as small mutton, and these were worth about the same as the best home-killed English mutton. A vigorous attempt was made during September to force up the price of frozen mutton, and this was successful to the extent of raising the nominal quotations about $\frac{1}{2}$ d. per lb., bringing the price of the best New Zealand to 4d. per lb. as the highest point.

Carcass Lamb.—As the price of British lamb was the same as that of mutton, it is not necessary to give the details of the trade. New Zealand lamb was uniform in price and worth from 3d. to 4d. per lb. throughout, while Australian and Argentine fetched about $\frac{1}{2}$ d. to $\frac{3}{4}$ d. per lb. less.

Pork.—The price of British pork in London was 6d. to 6 $\frac{1}{2}$ d. per lb., advancing temporarily about the 9th to 7d., Dutch generally fetching $\frac{1}{2}$ d. per lb. less. A few very small dairy-fed pigs were sold as high as 7 $\frac{1}{2}$ d., but the quantity of these was very limited. In the third week pork was higher in Birmingham than in London by 7s. per cwt., and by 4s. 8d. in Leeds and Liverpool.

THE PROVISION TRADE IN SEPTEMBER.

HEDLEY STEVENS.

Bacon.—During the greater part of the month of September trading was on much more satisfactory lines for the wholesale dealers, buyers being more numerous than sellers, on account of considerably reduced supplies from all points, and consequently advances were secured all round. It is said by those in possession of reliable records that bacon generally has this month reached higher prices than for over twenty years past. By the end of the month a sharp reaction had set in, as, with present prohibitive prices, the consumption showed a further considerable reduction. The cooler weather has also reduced the consumption of hams, and prices had fallen several shillings per cwt. by the end of the month.

America continues to send us very small quantities of both bacon and hams, and the latest cables report that their home trade is still good, and that there is no immediate prospect of being able to increase their shipments to this country. Some packers report that they are making in America equivalent to 88s. and 90s. per hundredweight for green light bellies, which are used extensively for breakfast bacon.

Canadian bacon has shown a further falling-off in quantities, and in consequence Danish and Dutch have been in good demand in districts rarely handling these descriptions, which has prevented any accumulation of stock in London. The cooler weather also enabled buyers to use these mild-cured meats with greater satisfaction.

The total imports of bacon from all points into the United Kingdom for the four weeks ending September 18th were 15,427 tons, against 19,636 tons in 1908 and 21,359 tons in 1907.

Prices for English and Irish bacon have been very close to imported

descriptions, and in consequence an improved consumptive demand is reported. English pigs continue in small supply, although in some districts there has been a slight increase in the quantities marketed.

The present is a fine opportunity for farmers to go extensively into the pig-breeding business, as the supplies of bacon from other countries, especially the United States of America and Canada, will probably continue to be small for some considerable time.

Cheese.—The improved demand reported during August has not continued, and stocks have accumulated at most distributing centres. This state of affairs has been a surprise to traders, cheese being relatively cheap in comparison with other foods. Doubtless the unseasonable weather has helped to decrease the consumption. At the end of the month the estimated stocks at the three principal distributing centres (London, Liverpool, and Bristol) were 325,000 against 313,000 last year, and 305,000 two years ago.

The receipts into Montreal have fallen off somewhat during the month, but from May 1st to Sept. 18th this year they show an increase over the same period last year of 42,618 cheese. Shipments from Montreal have also not been so heavy, bringing the present increase over last season to 21,206 boxes, but 134,318 less than the quantity in 1907. Prices have been easier, and by the end of the month finest September makes could be contracted at from 54s. 6d. to 56s. 6d., according to section, for shipment during October. The Ontario Department of Agriculture, in its latest report, states that the number of milch cows on July 1st in Ontario was 1,075,496, showing a reduction of 37,878 as compared with the same time last year, and 76,575 two years ago. However, weather conditions have been favourable and a large make of cheese has resulted.

The United States of America are still out of competition, and in consequence shipments to this country have been practically *nil*.

The New Zealand factorymen continue to ask about 58s. for contracts to cover their season's make, which merchants refuse to pay. Spot lots of last season's goods are nearly cleared.

Conditions being favourable, the make of English is still good, but not excessive. Prices are on the easy side, and farmers find it difficult to make sales to dealers at what they consider to be satisfactory prices.

Butter.—There has been a much improved demand throughout the month, and prices show advances of from 4s. to 6s. per cwt. The trade has been mostly in fancy goods, the secondary qualities being neglected.

Factorymen in New Zealand report very little contracting, as English houses refuse to pay the prices (106s. to 108s. c.i.f.) which are being demanded for the season's output. Last season's contracting resulted in serious losses to buyers; hence this year's timidity.

In Canada prices have advanced, and there is very little export business passing. The receipts into Montreal have decreased, and at the time of writing cable advices report that some factories have stopped cheese-making, and have turned their attention solely to the production of butter.

Arrivals from Siberia are about the same as last year, and the quality is fair.

The home make has continued good.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and SCOTLAND
in the Month of September, 1909.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	ENGLAND.		SCOTLAND.	
	First Quality.	Second Quality.	First Quality.	Second Quality.
FAT STOCK:—	per stone.*	per stone.*	per cwt.†	per cwt.†
Cattle:—	s. d.	s. d.	s. d.	s. d.
Polled Scots	8 3	7 8	40 6	36 7
Herefords	8 5	7 7	—	—
Shorthorns	8 1	7 4	39 5	35 8
Devons	8 4	7 6	—	—
	per lb.*	per lb.*	per lb.*	per lb.*
	d.	d.	d.	d.
Veal Calves	7½	7	8	6½
Sheep:—				
Downs	7½	6½	—	—
Longwools	6½	5½	—	—
Cheviots	7½	6½	7½	6½
Blackfaced	6½	6½	6½	5½
Cross-breds	7	6½	7½	6½
	per stone.*	per stone.*	per stone.*	per stone.*
	s. d.	s. d.	s. d.	s. d.
Pigs:—				
Bacon Pigs	7 4	6 11	7 0	6 3
Porkers	7 7	7 3	7 5	6 8
LEAN STOCK:—	per head.	per head.	per head.	per head.
Milking Cows:—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk ...	21 7	17 18	22 7	18 6
„ —Calvers... ..	21 6	17 18	20 1	17 0
Other Breeds—In Milk ...	18 8	14 9	19 5	15 16
„ —Calvers	—	13 10	18 12	15 7
Calves for Rearing	2 3	1 13	2 12	1 11
Store Cattle:—				
Shorthorns—Yearlings ..	10 4	8 12	10 0	8 14
„ —Two-year-olds ..	14 4	12 6	15 3	13 5
„ —Three-year-olds ..	17 15	15 8	17 12	16 7
Polled Scots—Two-year-olds	—	—	15 8	14 10
Herefords— ..	15 6	13 18	—	—
Devons— ..	14 3	12 2	—	—
Store Sheep:—				
Hoggs, Hoggets, Teds, and Lambs—	s. d.	s. d.	s. d.	s. d.
Downs or Longwools ...	28 11	24 5	—	—
Scotch Cross-breds ...	—	—	21 5	18 6
Store Pigs:—				
Under 4 months	25 8	19 6	22 8	19 1

* Estimated carcase weight.

† Live weight.

**AVERAGE PRICES of DEAD MEAT at certain MARKETS in
ENGLAND and SCOTLAND in the Month of September, 1909.**

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Quality.	London.	Birming- ham.	Man- chester.	Liver- pool.	Glas- gow.	Edin- burgh.
		per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
BEEF :—							
English	1st	55 0	52 6	52 0	—	60 0*	57 6*
	2nd	52 6	47 6	49 6	—	57 6*	50 6*
Cow and Bull ...	1st	38 6	46 0	45 6	43 6	41 6	42 6
	2nd	23 6	41 6	41 0	38 0	32 6	36 0
U.S.A. and Cana- dian :—							
Port Killed ...	1st	55 0	52 0	51 6	52 6	52 6	—
	2nd	49 0	47 0	48 0	48 6	49 0	—
Argentine Frozen—							
Hind Quarters..	1st	32 6	33 6	34 0	33 6	35 0	35 0
Fore ..	1st	26 6	28 6	28 0	28 0	29 0	28 6
Argentine Chilled—							
Hind Quarters...	1st	45 6	46 6	45 6	45 6	47 6	43 6
Fore ..	1st	30 0	31 6	31 6	31 6	32 6	30 6
American Chilled—							
Hind Quarters—	1st	61 6	63 0	63 0	63 0	—	64 0
Fore ..	1st	38 6	40 6	39 6	39 6	—	41 0
VEAL :—							
British	1st	59 0	59 0	64 6	68 6	—	—
	2nd	53 6	50 6	59 6	65 0	—	—
Foreign	1st	59 0	—	—	—	—	63 0
MUTTON :—							
Scotch	1st	59 6	—	—	—	60 6	52 0
	2nd	55 6	—	—	—	44 0	44 0
English	1st	56 6	59 6	56 0	55 6	—	—
	2nd	50 0	46 6	51 6	50 6	—	—
U.S.A. and Cana- dian :—							
Port Killed ...	1st	—	—	—	—	—	—
Argentine Frozen ..	1st	28 6	29 6	28 6	28 6	27 0	29 0
Australian ..	1st	27 6	28 6	28 0	28 0	27 0	—
New Zealand ..	1st	33 0	—	31 0	31 6	30 6	—
LAMB :—							
British	1st	60 0	58 6	56 0	57 0	60 6	54 6
	2nd	55 0	52 0	51 6	52 0	41 0	40 6
New Zealand ...	1st	36 6	39 0	33 6	34 0	39 6	37 6
Australian ...	1st	29 0	31 6	27 0	27 0	30 6	—
Argentine	1st	30 6	32 0	30 6	29 6	30 6	—
PORK :—							
British	1st	62 6	66 0	63 0	63 6	60 6	58 6
	2nd	58 0	62 6	58 6	59 0	57 6	50 0
Foreign	1st	61 0	—	62 6	62 6	—	—

Scotch.

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AVERAGE PRICES of British Corn per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1907, 1908 and 1909.

Weeks ended (in 1909).	WHEAT.						BARLEY.						OATS.					
	1907.		1908.		1909.		1907.		1908.		1909.		1907.		1908.		1909.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Jan. 2 ...	26	0	35	1	32	0	23	11	26	9	26	7	17	3	18	4	17	4
" 9 ...	26	1	35	2	32	9	24	2	26	9	26	11	17	4	18	3	17	5
" 16 ...	26	1	35	5	32	8	24	1	27	1	27	1	17	5	18	5	17	5
" 23 ...	26	2	35	6	33	2	24	5	26	11	27	3	17	5	18	5	17	8
" 30 ...	26	3	35	0	33	0	24	4	26	11	27	6	17	5	18	4	17	9
Feb. 6 ...	26	6	34	3	33	4	24	5	26	9	27	7	17	7	18	3	17	10
" 13 ...	26	7	33	1	33	8	24	1	26	9	27	8	17	7	18	0	17	11
" 20 ...	26	10	32	6	34	1	24	2	26	5	27	11	17	9	17	11	18	0
" 27 ...	26	9	30	11	34	5	24	2	26	3	28	0	17	9	17	8	18	0
Mar. 6 ...	26	8	30	5	34	10	23	11	26	1	27	11	17	11	17	10	18	2
" 13 ...	26	10	31	3	35	8	24	2	26	0	28	4	18	0	17	8	18	2
" 20 ...	26	10	31	7	35	9	24	0	26	2	28	0	18	1	17	11	18	5
" 27 ...	26	8	31	4	36	0	23	9	25	10	28	0	18	2	17	10	18	6
Apr. 3 ...	26	9	31	3	36	5	24	3	25	5	27	10	18	3	17	9	18	8
" 10 ...	26	8	31	2	37	4	23	9	25	13	28	0	18	6	17	7	18	10
" 17 ...	26	8	30	11	38	7	23	3	26	1	27	8	18	7	17	7	19	2
" 24 ...	26	10	30	10	41	4	23	3	25	5	28	2	18	9	17	9	19	9
May 1 ...	27	0	31	6	42	5	23	6	25	8	27	10	19	3	18	0	20	0
" 8 ...	27	6	32	4	40	9	24	0	25	9	27	7	19	7	18	4	20	3
" 15 ...	28	4	33	1	41	6	23	10	24	9	27	3	20	1	18	7	20	6
" 22 ...	29	7	33	8	42	8	24	3	25	9	27	0	20	5	18	10	20	11
" 29 ...	31	4	33	5	42	6	24	0	24	6	26	3	20	8	18	8	21	0
June 5 ...	32	0	33	1	43	1	24	7	25	10	25	7	20	7	18	4	21	3
" 12 ...	31	10	32	7	42	11	24	7	24	5	26	10	20	11	18	4	21	4
" 19 ...	31	4	32	0	42	7	24	11	24	2	26	10	20	9	18	5	21	6
" 26 ...	31	2	31	5	42	8	24	6	24	0	27	2	20	8	18	7	21	7
July 3 ...	31	3	30	11	42	9	24	8	23	11	27	2	20	11	18	7	21	9
" 10 ...	32	0	30	5	43	0	24	10	24	4	26	4	21	11	18	5	21	8
" 17 ...	32	6	30	7	43	3	24	6	23	1	26	10	21	1	18	5	21	9
" 24 ...	32	11	31	5	44	0	27	3	26	5	27	4	20	8	18	6	22	5
" 31 ...	33	2	31	10	43	5	26	4	24	4	24	6	21	2	18	7	22	2
Aug. 7 ...	33	5	31	6	44	9	26	6	23	1	27	4	21	3	18	9	22	11
" 14 ...	33	6	31	6	44	9	25	9	23	10	24	9	20	4	18	1	21	8
" 21 ...	33	7	31	2	41	6	25	0	24	5	23	11	19	8	17	10	19	8
" 28 ...	33	10	30	10	38	5	24	6	24	5	24	7	18	11	17	1	19	4
Sept. 4 ...	31	11	30	10	37	2	24	2	25	5	26	3	17	7	17	3	19	6
" 11 ...	31	4	31	5	34	11	24	4	25	11	26	1	17	6	17	6	18	5
" 18 ...	31	5	31	7	33	6	25	0	26	0	26	5	17	6	17	3	17	9
" 25 ...	31	8	31	5	32	9	25	3	26	8	26	8	17	8	17	2	17	7
Oct. 2 ...	32	6	31	7	32	2	25	5	26	11	26	9	17	9	17	2	17	2
" 9 ...	33	3	31	5	31	8	25	9	27	5	26	9	17	11	17	0	17	0
" 16 ...	34	4	31	2			26	3	27	6			18	0	17	0		
" 23 ...	35	9	30	11			27	2	27	5			18	7	16	11		
" 30 ...	36	3	30	8			27	7	27	5			18	10	16	11		
Nov. 6 ...	35	10	30	11			27	8	27	6			18	10	17	0		
" 13 ...	35	1	31	2			27	8	27	4			18	8	17	0		
" 20 ...	34	7	31	10			27	5	27	3			18	9	17	3		
" 27 ...	34	7	32	3			27	5	27	2			18	7	17	5		
Dec. 4 ...	34	7	32	7			27	1	27	2			18	6	17	4		
" 11 ...	34	8	32	8			27	0	27	0			18	5	17	4		
" 18 ...	34	9	32	9			27	1	26	9			18	3	17	3		
" 25 ...	34	6	32	2			26	10	26	8			18	0	17	2		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lbs.; Barley, 50 lbs.; Oats, 39 lbs. per Imperial Bushel.

AVERAGE PRICES of Wheat, Barley, and Oats per Imperial Quarter in FRANCE, BELGIUM, and GERMANY, and at PARIS, BERLIN, and Breslau.

	WHEAT.		BARLEY.		OATS.	
	1908.	1909.	1908.	1909.	1908.	1909.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
France : August	37 9	41 6	25 4	27 0	19 9	22 10
September	38 7	39 6	25 9	25 9	19 11	20 9
Paris : August	38 4	42 6	26 2	29 2	19 3	24 8
September	39 9	41 5	26 2	27 7	20 7	19 8
Belgium : August	34 5	42 8	25 4	24 8	20 9	24 5
Germany : July	44 9	58 2	26 9	29 9	22 8	28 4
August	42 11	49 1	27 9	28 4	22 0	24 5
Berlin : July	47 5	55 10	—	—	22 5	25 3
August	43 8	51 10	—	—	22 6	23 9
Breslau : July	43 11	58 4	28 6	—	20 6	26 7
			(brewing)	(brewing)		
			26 0	26 0		
			(other)	(other)		
August	43 9	53 2	30 8	28 11	20 6	26 5
			(brewing)	(brewing)		
			26 0	25 0		
			(other)	(other)		

NOTE.—The prices of grain in France have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*; the Belgian quotations are the official monthly averages published in the *Moniteur Belge*; the German quotations are taken from the *Deutscher Reichsanzeiger*, the prices for the German Empire representing the average of the prices at a number of markets.

AVERAGE PRICES of British Wheat, Barley, and Oats at certain Markets during the Month of September, 1908 and 1909.

	WHEAT.		BARLEY.		OATS.	
	1908.	1909.	1908.	1909.	1908.	1909.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
London	32 8	35 7	26 0	27 7	18 1	18 6
Norwich	30 1	34 4	27 1	25 11	16 7	17 7
Peterborough ..	30 8	33 1	25 4	26 2	16 11	17 4
Lincoln	30 11	35 5	25 7	26 4	17 2	18 1
Doncaster	31 3	32 6	25 0	26 9	18 1	20 5
Salisbury	31 0	35 1	27 3	25 2	16 11	18 3

AVERAGE PRICES of PROVISIONS, POTATOES, and HAY at certain MARKETS in ENGLAND and SCOTLAND in the Month of September, 1909.

(Compiled from Reports received from the Board's Market Reporters.)

Description	London.		Bristol.		Liverpool.		Glasgow.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
BUTTER —	per 12 lb	per 12 lb	per 12 lb	per 12 lb	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British	14 0	13 0	14 0	12 6	—	—	14 6	—
Irish Creamery	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
„ Factory	117 6	114 0	117 0	114 0	114 0	110 0	115 0	—
Danish	106 0	101 6	103 6	98 6	101 0	94 0	—	—
Russian	121 0	119 0	—	—	123 6	121 0	122 0	—
Canadian	105 0	103 0	108 0	99 6	105 6	101 0	105 0	99 0
Australian	115 0	114 0	117 0	113 0	114 6	111 6	114 0	—
New Zealand	112 0	110 0	111 0	101 0	—	—	118 0	—
	118 0	114 0	114 6	109 0	—	—	—	—
CHEESE :—								
British—								
Cheddar	77 6	65 6	73 0	62 0	72 0	68 0	65 0	60 0
	120 lb	120 lb			120 lb.	120 lb		
Cheshire	76 0	69 0	—	—	67 0	62 0	—	—
	per cwt	per cwt.			per cwt	per cwt.		
Canadian	58 0	57 0	58 6	56 0	58 0	56 0	58 6	56 0
BACON :—								
Irish	77 0	74 0	79 0	74 0	77 6	74 0	76 0	74 0
Canadian	71 6	—	73 0	71 0	72 0	70 0	73 6	71 6
HAMS :—								
Cumberland	104 6	95 0	—	—	—	—	—	—
Irish	102 6	96 0	—	—	—	—	100 0	92 6
American (long cut)	64 6	63 6	66 6	63 6	67 6	62 6	66 6	64 6
EGGS :—	per 120	per 120	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British	12 8	11 8	10 10	10 0	—	—	—	—
Irish ..	11 7	10 2	10 3	9 9	10 8	9 9	10 4	9 2
Danish	11 4	9 8	—	—	10 8	9 8	10 3	9 1
POTATOES :—	per ton.	per ton.	per ton.	per ton	per ton	per ton	per ton.	per ton.
British Queen	62 0	52 0	59 0	50 0	51 6	46 6	53 6	40 0
Snowdrop	62 0	57 0	63 6	53 6	61 6	51 6	—	—
Up to Date	58 0	51 0	59 0	50 0	46 6	41 6	—	—
HAY :—								
Clover	97 0	78 0	80 0	65 0	92 6	64 6	68 0	63 0
Meadow	91 6	78 0	72 6	60 0	—	—	—	—

DISEASES OF ANIMALS ACTS, 1894 to 1903.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

DISEASE.	SEPTEMBER.		EIGHT MONTHS ENDED SEPTEMBER.	
	1909.	1908.	1909.	1908.
Swine-Fever:—				
Outbreaks	74	122	1,323	1,593
Swine Slaughtered as diseased or exposed to infection .	992	900	11,984	9,400
Anthrax:—				
Outbreaks	85	62	989	820
Animals attacked	100	79	1,311	1,092
Foot-and-Mouth Disease:—				
Outbreaks	—	—	—	3
Animals attacked	—	—	—	112
Glanders (including Farcy):—				
Outbreaks	49	69	426	635
Animals attacked	145	149	1,515	1,932
Sheep-Scab:—				
Outbreaks	5	10	476	647

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

DISEASE.	SEPTEMBER.		EIGHT MONTHS ENDED SEPTEMBER.	
	1909.	1908.	1909.	1908.
Swine-Fever:—				
Outbreaks	4	9	86	141
Swine Slaughtered as diseased or exposed to infection ...	63	384	1,554	3,247
Anthrax:—				
Outbreaks	1	1	6	7
Animals attacked	1	1	6	10
Sheep-Scab:				
Outbreaks	4	7	309	281

ANNUAL AND SERIAL PUBLICATIONS FILED IN THE BOARD'S LIBRARY.

The following is a list of the annual and serial publications which are filed in the Library of the Board. These volumes may be consulted on application at the office of the Board, 8 Whitehall Place, S.W., between the hours of 10 a.m. and 5 p.m.

Austria-Hungary—

Annuaire Statistique Hongrois.
Bericht über das Österreichische Veterinärwesen.
Commerce Extérieur des Pays de la Sainte Couronne Hongroise.
Statistik des Auswärtigen Handels.
Statistisches Handbuch.
„ Jahrbuch des K. K. Ackerbau-Ministeriums.
Jahresbericht über das Veterinärwesen in Ungarn.

Belgium—

Annuaire Statistique de la Belgique.
Bulletin du Service de la Police Sanitaire des Animaux Domestiques.
Recensement Agricole.
Tableau Général du Commerce avec les Pays Etrangers.

Bulgaria—

Statistique Agricole.
Statistique du Commerce et de la Navigation.

Cyprus—

Annual Report of the Director of Agriculture.

Denmark—

Aarsberetning fra det Veterinære Sundhedsraad.
„ om det kongelige danske Landhusholdningsselskabs Virksomhed.
Danmarks Vareindførsel-og-Udførsel.
Landøkonomisk Aarbog.
Statistisk Aarbog.

France—

Annales de l'Ecole Nationale d'Agriculture de Montpellier.
Annuaire de l'Agriculture et des Associations Agricoles.
Rapport . . . du Budget Général (Ministère de l'Agriculture).
Tableau Général du Commerce et de la Navigation.

Germany—

Arbeiten der Deutschen Landwirtschafts-Gesellschaft.
Auswärtiger Handel des D. Zollgebiets.
Bericht über die Tätigkeit der Kgl. Agrikultur-botanischen Anstalt in München.
Berichte über Land- und Forstwirtschaft des Auslandes.
Jahrbuch der D. Landwirtschafts-Gesellschaft.
„ für Bremische Statistik.
Jahresbericht über das Gebiet der Pflanzenkrankheiten.
„ „ die Fortschritte auf dem Gesamtgebiete der Agrikultur-Chemie.
„ „ „ Verbreitung von Tierseuchen im Deutschen Reiche.
Landwirtschaftliche Jahrbücher.
Mitteilungen aus der Kaiserlichen Biologischen Anstalt für Land- und Forstwirtschaft.

Statistisches Jahrbuch für das Deutsche Reich.
Vierteljahrshefte zur Statistik des D. Reichs.
Württembergische Jahrbücher für Statistik und Landeskunde.
Zeitschrift des K. Bayerischen Statistischen Bureaus.

Holland—

Statistiek van den In-, Uit- en Doorvoer.
Verslaagen en Mededeelingen van de Directie van den Landbouw.
Jaarcijfers voor det Koninkrijk der Nederlanden.

Italy—

Annali della Regia Scuola Superiore di Agricoltura di Portici.
Annali di Agricoltura.
Annuario Statistico Italiano.
Movimento Commerciale del Regno d'Italia.

Norway—

Aarsberetning angaaende de offentlige foranstaltninger til landbrukets fremme.
Norges Handel.
Statistisk Aarbog.
Veterinaervæsenet og Kjodkontrollen.

Portugal—

Annuario Estadistico
Commercio e Navegação.

Roumania—

Annuaire Statistique de la Roumanie.
Commerce Extérieur de la Roumanie.

(To be continued.)

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[NOTE.—The receipt of *annual* publications of foreign agricultural and other departments, experiment stations and societies is not noted in the monthly list of additions to the Library.]

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THE JOURNAL OF THE BOARD OF AGRICULTURE.

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THE INSECT AND ALLIED PESTS OF THE HOP (Continued.)

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THE HOP APHIS.

(*Phorodon humuli*, Schnk.)

The Aphis, or "Fly," is by far the most general and persistent enemy of hops in all parts of the world where they are grown. Every year it is present to a greater or less extent; every locality is liable to its invasion, and every variety of hop is subject to the depredations of this small insect. So persistent is the attack of Aphis in some years that as many as seventeen washings have been given before the pest was conquered. In 1882 the damage done by the Aphis was said to amount to £1,750,000 and over £200,000 was spent in labour.

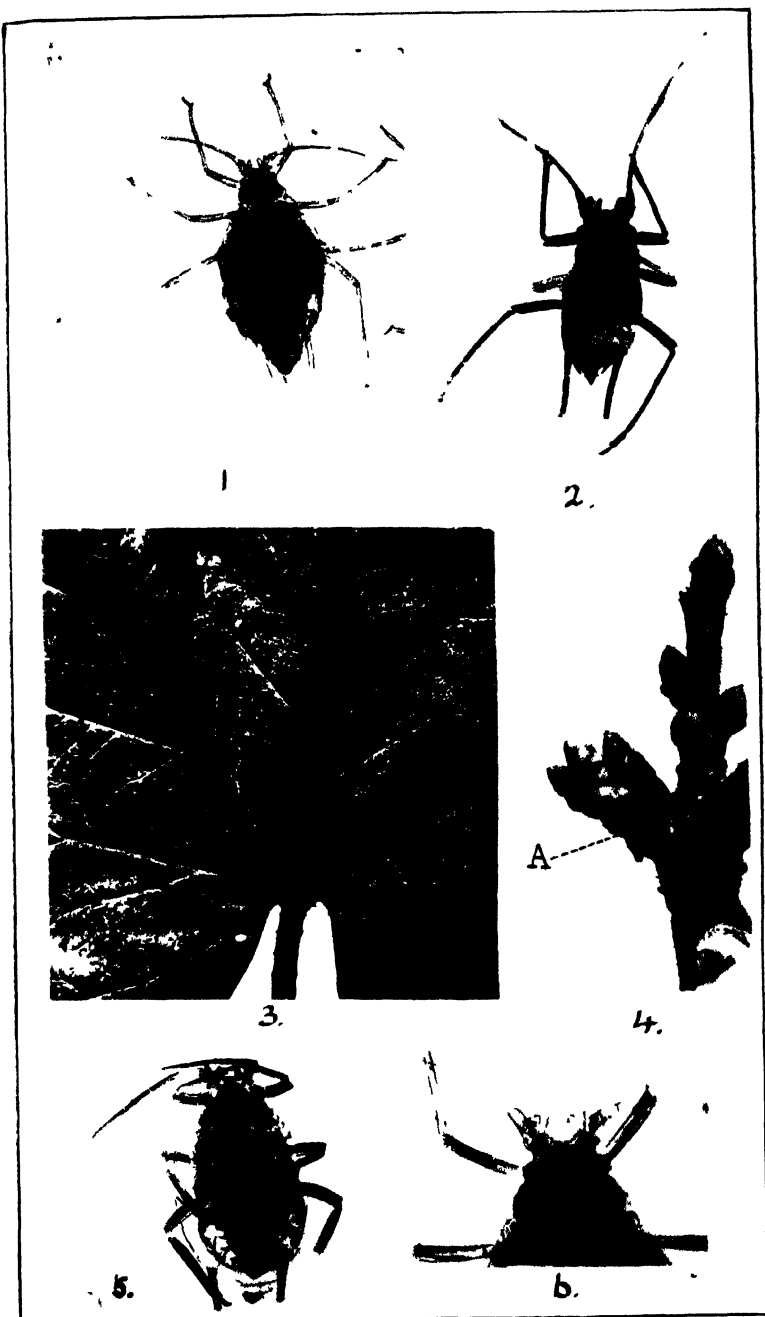
The life-cycle of the Hop Aphis was first traced by Dr. Plomley in 1849 in the Maidstone area, and was afterwards followed by Riley, the American entomologist, and others. Koch in 1854 records the Hop Aphis on Plum and Sloe, and says: "In June this Aphis quits the leaves of the Sloe, and then betakes itself to the wild and cultivated hop." Two other German authors—Taschenberg and Kaltenbach—in 1880 and 1874, also refer to it as coming from Prunes. At present we are still unable to account for all the vagaries of this "dolphin," and there are evidently important features in its biology

The first part of this article, with Plates I, II. and III., appeared in the *Journal*, October, 1909, p. 555.

of which we are ignorant. The enormous rate of increase of the Hop Aphis may be judged from the photograph reproduced here (Pl. IV., Fig. 3), which shows part of a leaf covered with lice, the progeny of four females in fourteen days. The damage done by Aphis is twofold. Firstly the insects suck out the sap of the leaves and cause them to turn a sickly hue, and often to become yellowish; secondly their honey-dew and excrement fall on the upper surface of the leaves and coat them with a dark, gummy mass, upon which a black fungus grows. These leaves (Pl. V., Fig. 1) soon lose their vitality, and a "black blight" is the result.

Life-history.—The life-history of the Hop Aphis is somewhat complex. The winter is passed almost entirely in the egg condition on the damson, sloe, bullace, and occasionally on plums and greengages. A few insects hibernate in the hop hills; these are the large fat green lice seen early in the year on the hop shoots. The eggs (Pl. IV., Fig. 4A) are found in the clusters of buds and in their axils. They are shiny black in colour, and many present a shrunken appearance; these latter are infertile eggs.

The young are at first green, and at once feed on the tender unfolding leaves or opening blossom buds. The result of their punctures is that the leaves curl up, and then the lice are protected from any wash. As many as three generations may occur on the prunes. In late April or May many of them become nymphs; wing-buds gradually appear at the sides of the body, and from the middle of May onwards to early July winged viviparous females arise. These leave the damsons and fly away. In some years they all leave about the same time, in others in batches extending over some time. Most, however, have left the prunes by the end of June. Very many of these migrants settle on plants upon which their young cannot subsist, and die, but those which reach the hops as the so-called "fly" soon commence to produce small pale living young (nits or lice) (Pl. IV., Fig. 3). The "fly" may settle on any leaves, but I have noticed that they shelter most under the top leaves, especially amongst the smallest and only partially expanded ones. There they get a large amount of shelter, and are protected from any fine spray. The larvæ or lice soon grow to mature wingless females



THE HOP APHIS, *Phorodon humuli* Schenk

FIG 1—Wingless female of Hop Damson Aphis (greatly enlarged)

FIG 2—A younger female (greatly enlarged)

FIG 3—Larvæ or Lice on Hop Leaf (natural size)

FIG 4—Ova (x) on Prune (twice natural size)

FIG 5—Oviparous female from Damson (greatly enlarged)

FIG 6—Head of wingless female, showing frontal processes (greatly enlarged)

(green lice), and they commence to produce more pale young, and so on until September, or even early October in some late seasons. In the meanwhile winged broods may now and again occur on the hop and fly off to other hops and set up a fresh area of attack.

In September and October a winged brood (return-migrants) fly back from the hops to the damsons, &c. Great numbers of these get caught up on oak, apple, and various other trees, and die. Those that reach their proper food plant produce living young, from which in October a generation of males and females are formed. The males are winged, and the egg-laying females are wingless. According to Riley, the first generation on the prunes is sexed. This is not the usual case, according to my observations, although it does happen. Males may either arise on the prunes or fly from the hops later than the return female migrants, which have produced the wingless oviparous females. Then these females deposit the sexually-produced eggs. Riley found eggs on prunes as early as October 1st. I have never found any as early as this. The main attack of *Aphis* on hops undoubtedly comes from the damsons, &c.

Natural enemies of the hop-damson *Aphis* are not many, and have little or no effect in checking this pest. Amongst the most important are the Ladybird Beetles, or *Coccinellidæ* (Pl. VI., Fig. 2). Both adult beetles and their larvæ, or so-called "niggers," feed upon the young and mature *Aphides*. The larvæ of the Lace-wing Flies (*Chrysopidæ*), or Golden-eye Flies, as they are called in Kent gardens, are also often to be found ravenously eating the "dolphins." Their curious stalked eggs (Pl. VI., Fig. 3B) are very noticeable.

Hover Flies (*Syrphidæ*) (Pl. VI., Fig. 1), which feed on plant-lice generally, in their leech-like larval stage, seldom occur amongst hops, and very few Hop *Aphides* are parasitised by Chalcids and other parasitic hymenoptera. Ormerod records a Harvest Mite, one of the *Trombididæ*, as attacking the Hop *Aphis*. It was not identified, and does not appear to have been observed since 1885.

Treatment and Prevention.—As long as there are wild prunes in the hedgerows, so long shall we have a certain

amount of *Aphis* on the hops. That a very large percentage come from the damson and the plum is now a well-established fact. If the *Aphis* on the prunes were destroyed, much of the hop blight would be prevented. This can be done, but it is no use unless it is done by all in a district, for *Aphis* can migrate for some distance. If damson and plum trees are sprayed with lime and salt wash in February or early March, much of the *Aphis* is prevented from hatching, and any that may have appeared are killed. If this has not been done, an early heavy spraying with paraffin emulsion will kill the mother-queens before they produce their young. This spray should not be used until the blossom is well set. Treatment by washing hops is well known to everyone in general principle. Either quassia and soft soap or nicotine and soft soap are the best remedies, for they in no way harm the foliage. Nicotine has far greater penetrating powers than any other substance used, and its effects are much more lasting. Many patent washes are employed, some with success, others not.

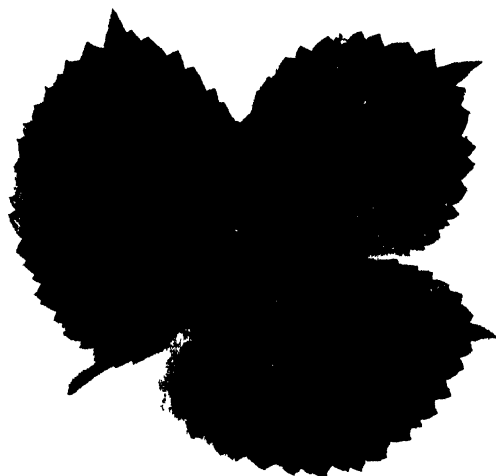
The main thing to aim at is to hit every part of the plant. The idea of using a fine mist is a fatal error; the finer the mist the less likely are the particles to run into drops and so penetrate the small folded top leaves, which one seldom sees cleaned when a fine spray is sent out. Repeated observation has shown that this is where the lice survive and so carry on the attack—not on the large lower leaves, as seen in the photograph. Nothing but a thorough drenching will get at these, and one good drenching will do more good than a dozen fine sprayings. Owing to frequent migrations in certain years, several sprayings may be necessary. It is advisable to have the lower leaves stripped where the hops are washed by horse machines, as the under surface of many leaves is not hit at all. This is not necessary where the spraying is done by hand. The work can be far more thoroughly done in the latter way than by horse power. Hand-spraying may be carried out by means of knapsacks, but large areas can only be satisfactorily done by means of steam tackle.

It is most important to attack the Hop *Aphis* as soon as it appears, for if left for even a couple of weeks under favourable conditions, enormous numbers may be produced, and then much harm is done, and they are more difficult to

PLATE V



1.



2.

FIG. 1.—Hop Leaf with Aphis excrement, honey dew, and "soot fungus."
FIG. 2.—Normal leaf.

suppress. Great pressure is sometimes employed in spraying, but this is undoubtedly bad for a delicate plant like the hop; the leaves get blown off and bruised, and where certain washes have been employed I have seen as much harm done as by the lice.

Paraffin emulsions are sometimes recommended and used for Hop Aphis, but, like liver of sulphur, their effect on the foliage is uncertain, and frequently much scorching results. Paraffin has, however, been used in certain patent washes without any serious results. On the other hand, soap and quassia or nicotine are quite innocuous. The quantity of soft soap used varies from 4 up to 12 lb. per 100 gallons, with 6 to 8 lb. of quassia. If nicotine is used, the minimum quantity of soap will do. If soft soap alone is used, and this will readily kill Aphis, as much as 10 to 12 lb. is required; below 8 lb. I have not found it strong enough to kill Aphis.

The quassia is sometimes steeped in cold water, and the extract mixed with the soap. If this is done, not nearly so much is got out of the quassia as if it is allowed to simmer in bags for some hours, and then the soap added, and both boiled together. The bags can then be withdrawn, and very little bitter extract can be obtained again. Tobacco may also be used, or pure nicotine. If the latter, I find that 6 oz. of 98 per cent. nicotine are sufficient for 100 gallons, plus the soap; if tobacco, about 2 lb. to the 100 gallons is enough. Roll tobacco seems to be the best to use.

EARWIGS.

(*Forficula auricularia* and *Labia minor*.)

Both the large and small Earwigs are found on hops in some numbers in certain years. The large Earwig seldom flies; the small one is constantly on the wing.

The only case of damage caused by these insects that has come to my notice was in 1899, when large numbers of them occurred on hops at Wye. They were watched biting the young and tender leaves, which, as they grew out, assumed a stunted and ragged appearance. In many hills growth was quite stopped. The majority of the Earwigs hid away during the day under clods of earth and in the soil; a few sheltered

under the lower leaves. They seemed to feed for some hours into the night. Numerous nests were found later in and around the plant centres. The earwigs were jarred off the bine in the daytime and collected with those that hid in the soil by placing pieces of moist sacking at the base of each bine.

A SPRING-TAIL.

(*Entomobrya nivalis*, Linn.)

This small apterous insect may be found on all kinds of plants, and occurs commonly under the bark of trees.

A single case only of its damaging hops is on record. This was at Chilham, in 1907, where it did considerable harm. The attack manifested itself in July, and when the garden was visited on the 18th and 19th enormous numbers of these small Spring-tails were found, some on the bines, others on the soil. The attack started at the tips, and in many cases the damage extended down to the lower parts. Most of the burr was damaged and the bine itself in all tender places. The damage was done mainly at night, but many could be found feeding in the daytime. These insects are very shy, and fall or spring to the ground at the least shock. They seem to shelter under clods of earth during the day, and in crevices in the poles.

This Spring-tail apparently lays its ova under the bark of trees, and also in moss, damp grass, and under stones.

The importance of Apterous is becoming more noticeable every year. Another species, *Smynturus luteus*, I have found this year damaging currant and potato foliage to a considerable extent. Although they have a weak biting mouth, they are nevertheless very harmful when present in numbers. The hop garden attacked was well washed with soft soap and quassia, sulphured, and washed again, and the land dressed with lime. This checked the pest, but did not destroy it entirely.

Probably in such bad attacks as this the best way would be to jar all the Apterous off, having previously smeared the bine for 3 ft. up with molasses to prevent those on the soil getting back again.

THE HOP RED SPIDER.

(Tetranychus althææ.)

This small acarus (Pl. II., Figs. 4 and 5) in some years does a lot of harm to the hops. The disease produced by it is sometimes spoken of as "fire blast."

It is especially in hot, dry seasons that Red Spider does the most damage. Whitehead states that in the excessively dry, hot summer of 1868, thousands of acres in England and on the Continent were ruined by this pest. Again, in 1872, 1884, and 1885, much harm was done. The damage is caused by the small acari sucking and gnawing the leaves below, which produces, first a curious mottled appearance, and then a yellow or even dull reddish-brown and grey discoloration, and later the leaves may fall. In addition, these acari spin a fine silken webbing, beneath which they live and breed, and this acts injuriously by choking up the breathing pores of the foliage, as well as by sheltering and protecting the mites. The fine silken webbing is seen attached to a red spider in Fig. 5.

The *life-history* is comparatively simple. The adults (Pl. II., Fig. 4) are very variable in colour, some being a translucent grey, others green or greenish-brown, others dull red; all have dark spots on the body and scanty indistinct hairs. It is the females which become red towards the end of August and on to the following spring. The mature male and female have four pairs of legs, as seen in the illustration. The females lay their ova under the webbing; they are spherical, and pale translucent green to pale gold in colour. They hatch in from seven to eight days. The young or larval Red Spiders have only six legs, and can be recognised by this characteristic. The larvæ moult their skin and become eight-legged nymphs, and then moult again and become mature. The cast skins remain under the silken webbing.

Under favourable circumstances Red Spiders breed right through the summer, and hibernate in the mite condition in the soil beneath fallen leaves, in crevices in the poles, under the rind of the snags, or any convenient shelter.

In spring they appear on the young leaves, but do not

commence to breed in any numbers until June. An attack of Red Spider usually begins on the lower leaves. This species is also found living on the hollyhock and French bean.

The Red Spider of vines (*Tetranychus telarius*) is quite distinct from the Red Spider of Hop, being much smaller, as I pointed out in my report of 1903.*

Prevention and Treatment.—There is no doubt that the red female acari hibernate in crevices, &c., of hop poles, in broken pieces of bine, and in the snags and other places. It is thus essential to see that all woodwork is well cleaned and made as smooth as possible, and that all unnecessary shelter is burnt in winter. The increasing use of wire undoubtedly tends to the decrease of this pest. After an attack it would be well to have all woodwork in wired gardens well drenched with strong paraffin emulsion in winter, or with any patent wash left over from spraying.

The best wash for Red Spider is liver of sulphur, but liver of sulphur frequently harms the foliage; so also does paraffin emulsion, the other acaricide. One or the other must be used, as no other substance is known to affect these mites. Repeated experiments with all strengths of nicotine have not given a single good result, either on the *Bryobia* or *Tetranychus*. It is necessary to use force with the wash for this pest, both in the case of liver of sulphur and paraffin, as the wash needs to be driven hard so that it breaks the webbing and penetrates to the acari beneath. It is also necessary to wash twice in succession with an interval of about ten days, as no known acaricide will harm the eggs.

If there is a combined attack of Aphis and Spider, then nicotine can be mixed with the liver of sulphur. Liver of sulphur may be used up to $2\frac{1}{2}$ lb. to the 100 gallons, but this may affect the leaves under certain conditions, and it is safest not to use more than $1\frac{1}{2}$ lb.

Miss Ormerod records the Red Spider of hops as being destroyed by a small black ladybird beetle known as *Scymnus minimus*, Rossi.

* *Second Report on Economic Zoology* (British Museum, N.H.), p. 142, 1904.

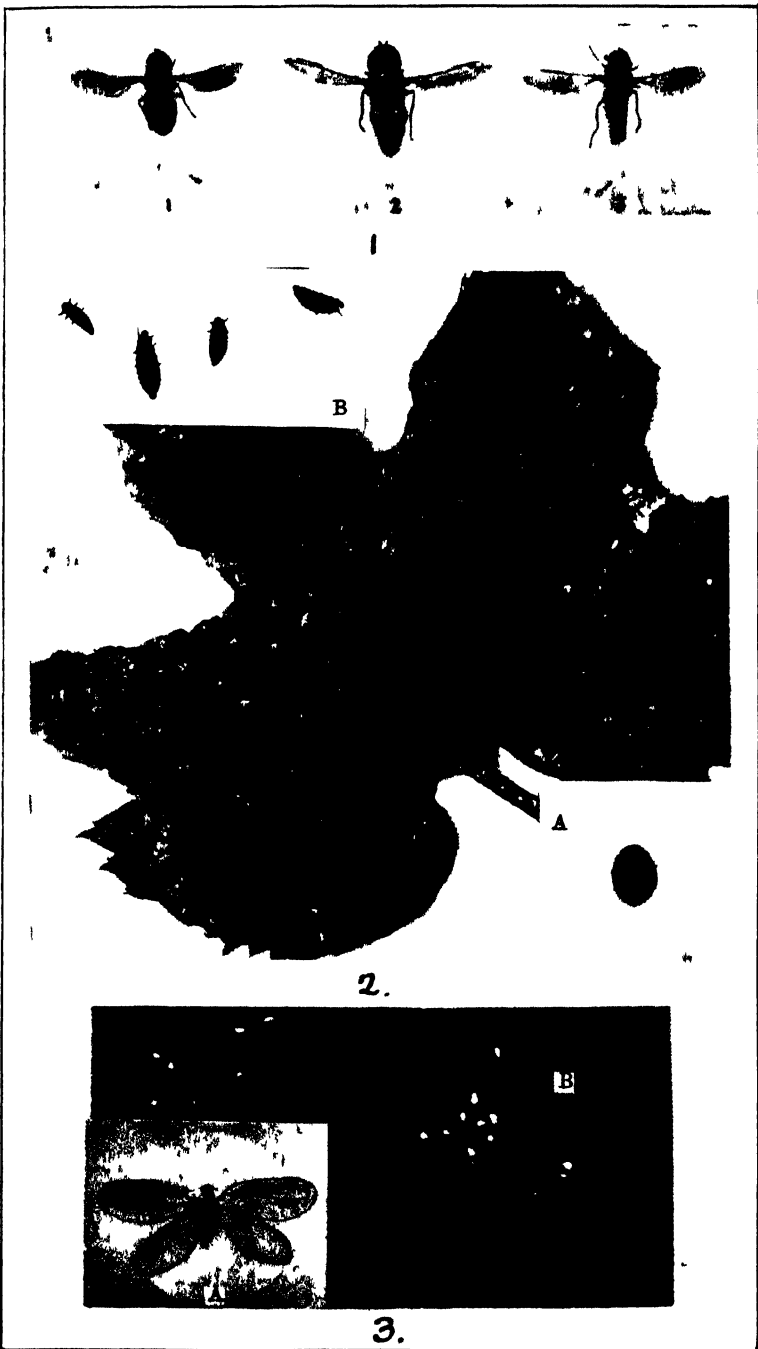


FIG 1 Hover or Syrphus Flies 1 *Syrphus rileyi* 2 *Catalpa pyrastris* 3 *Syrphus laticornis*
 FIG 2 Ladybird Beetle (*Coccinella*) A Seven Spotted Ladybird (*Coccinella*

septempunctata) B Larva or Niggers and Pupae on Hop Leaf
 FIG 3 —Adult and Ovum of the Lace Wing Fly (*Chrysopa*)

MILLEPEDES OR FALSE WIREWORMS.

(Blanjulus guttulatus, etc.)

The Millepedes, also known as False Wireworms and as Thousand Legs, are frequently found in large numbers in hop hills. They seem to take up their abode mainly where there has been a certain amount of decay. This they not only increase, but they will, I feel sure, attack sound roots and healthy parts, and are undoubtedly the cause of some loss in hop gardens. They frequently accompany Wireworms.

The most usual species in hops is the small pinkish Snake Millepede (*Blanjulus guttulatus*). A large dark species of *Julus*, usually called *Julus londonensis*, also occurs, but does little or no harm.

The Millepedes do not undergo any definite transformation. The young are hatched very like the adult, but they are composed of a few segments, and have three pairs of legs. They can always be distinguished from a Wireworm or other true insect by the legs not all being on the first three segments.

The females deposit their eggs from December to May under stones, amongst decaying vegetation, and in decaying wood, and also amongst hop roots.

Fortunately Millepedes can be easily trapped in the same way as Wireworms, but it is best to use partially decayed roots for them. Slices of marrow have proved a most tempting bait. Lime is also obnoxious to them when prong-hoed into the soil.

THE LONG-HORNED CENTIPEDE.

(Geophilus longicornis, Leach.)

Miss Ormerod gives some notes on the possible damage done by this myriapod at Temple Laugherne, near Worcester, but it is now known that the Centipede is beneficial, as it feeds upon other insects, slugs, &c., in the soil, and does not touch vegetation.

NETTLE-HEAD IN HOPS.

(Heterodera schachtii, Bos.)

The presence of this Eelworm disease can be recognised by the smaller size of the leaves and their shrunken appear-

ance, and by their difference in colour from healthy ones; the leaves may also curl at the edges, and become somewhat spotted with the borders serrated, resembling frequently the wild hop. The growth is stunted, and the bine ceases to hold and falls over. The disease is known as Nettle-head, and the term "skinkly" plants is sometimes applied to them.

The cause of the disease can be ascertained by examining the root fibres, when small shiny grey or brown nodules will be found on them, about the size of a pin's head. It will also be noticed that the delicate rootlets are thickened, and many are found to be decayed. Any part of the rootlets may carry the parasites. They have been found some 4 ft. from the hill, and probably exist still further away, and spread to the fibres of the other stocks around the infested centre.

This disease is produced by an Eelworm known as *Heterodera schachtii*, which also attacks beetroot and sugar beet on the Continent. It has recently been reported as doing considerable damage to oats in Yorkshire, and it also occurs on cabbage, rape, mustard, garden cress, mangolds, charlock, and couchgrass.

The pest may easily be spread with mud on men's boots and on implements, and is also said to be carried with manure. As a rule it spreads but slowly, but during the last three years the increase seems to have been more rapid. It exists in Kent and Worcestershire, and apparently in Hampshire.

The life-cycle of the parasite is fairly fully known, but there is still much more to be ascertained.

The yellowish white or brown bodies on the rootlets are the females, which at first lie under the rind. Afterwards the rind bursts, and the lemon-shaped adult becomes exposed, but retains her hold of the rootlet (see Pl. III., Fig. 5). In these lemon-shaped bodies we find both eggs (seen in the figure) and living young, which are passed out into the soil, where the former soon hatch. The young Eelworms bore into a neighbouring rootlet, and there develop. Those that become females gradually swell into the lemon-shaped bodies referred to, and cause the rind over them to burst; those that become males mature in their old skin and then bore their

way out through it and the rind and enter the soil, where they are found as minute white worms, which wander about and fertilise the females.

The entire development takes from four to five weeks, and successive generations occur throughout the year, reproduction going on as late as November in any case.

Treatment.—The methods of prevention and treatment that suggest themselves from experiment are the following :—(1) The application of lime, for it has been noticed that this and other eelworm attacks are most frequent in soils deficient in lime, and that an application of it to infected soil has proved of benefit; (2) the use of sulphate of potash at the rate of from 2 to 3 cwt. to the acre. This undoubtedly affects the parasites in the soil, not only just around the affected hill, but also around those near it; (3) collection of the parasites by means of "trap" plants. It has been found that winter rape especially, sown thick, soon becomes attacked. The young plants may then be dragged up and destroyed; a second sowing should be made at once and treated in the same way. It appears that buckwheat attracts this eelworm, and it might be tried. This is especially to be recommended where a badly diseased hill has been grubbed, for many of the worms will be left with the fine rootlets in the soil, and would spread to neighbouring hills. An interesting feature first noticed by Percival is that transplanted hops suffering from Nettle-head show no further signs of the disease. It is possible, therefore, that cutting away the roots or digging up and replanting might be effectual.

THE STEM EELWORM.

(*Tylenchus devastatrix*, Kuhn.)

Some years ago Prof. Percival* referred to the presence of this common plant parasite in hops. The part it played in connection with Nettle-head was very doubtful, and it may now be said that it has nothing to do with that specific disease.

This Eelworm nevertheless may frequently be found in the roots of hops that are either unhealthy or dying. In several cases investigated during the last three years I have

* *Journal S.E. Agric. College*, No. I. p. 7, 1895.

found this nematode, but never, it is true, in very large numbers, and always in those parts of the stock that were more or less decayed. With them a great amount of *Fusoma* spores has always been found, and at present nothing further can be said on this matter. The too frequent dying back of hops is not understood, and the exact part played by the *Tylenchus* can be merely a matter of conjecture. It is certainly a subject that requires special investigation. In the cases I have examined there have always been found both the *Tylenchus* and the *Fusoma*. I am inclined to think that the *Tylenchus* precedes the *Fusoma*, but that the actual cause of disease is the fungus; for the number of worms present in each case was not sufficient to cause any marked symptoms of disease, such as we see in the Tulip-root of oats or the Eelworm disease of onions. A recent case of the dying back of hops *from the top* investigated at Rainham showed both these organisms in the plants, but in this case neither parasite seemed sufficient to account for the loss of seven acres of young plants.

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SMALL FRUIT GROWING IN KENT.

CECIL H. HOOPER, M.R.A.C.

Small fruit, such as raspberries, gooseberries, red and black currants, and also strawberries, are largely grown in nearly all parts of Kent. The system of strawberry culture resembles in many respects that of Hampshire, which has recently been described in this *Journal* (June, 1909, p. 186), and it is proposed in the present article to confine attention to the other small fruits.

Preparation of Land for Small Fruits.—To be successful with small fruits, the soil must be good, well situated, fertile, clean from weeds, and well cultivated. A good working soil is a great asset. For strawberries, raspberries, and bush fruit on arable land, the best practice consists in applying some 30 tons of dung per acre, then ploughing seven inches deep with three or four horses, following each furrow with a heavy brake drawn by two horses to subsoil the ground, stirring it some four or five inches deeper. This is the method followed by some of the best growers; it is almost

equivalent to trenching, and costs much less. Steam cultivation to stir the soil may be employed if a large area is to be planted.

The Raspberry.—The raspberry is a plant that responds to heavy manuring. The varieties now most popular for field cultivation in Kent are "Superlative" and "Hornet," which have replaced "Carter's Prolific" and "Norwich Wonder," the favourites of twenty years ago. The raspberry is propagated from young plants dug up yearly from the side of the parent plant; these suckers or "spawn" are best when taken from young plantations. They should be planted out in land well cleaned, well manured, and deeply worked, the tops being previously cut off to about six inches above the ground line. A common distance for planting is 4 ft. 6 in. between the rows, and 2 ft. apart in the row, using one, two, or even three plants to a hole, depending on the strength of the sucker. The planting is done from November to the end of February, avoiding frosty weather, and keeping the roots of the suckers duly protected from frost and drought before planting by carefully bedding them in the soil.

The approximate cost per acre of forming a raspberry plantation, including the first year's cultivation, if everything is well done, will be somewhat as follows:—

	£	s.	d.
Forking out weeds	0	5	0
Manuring, ploughing and subsoiling	7	15	0
Heading canes and planting in plough furrow, 4 ft. 6 in. row, 2 ft. apart	1	0	0
10,000 raspberry plants at from £3-£10 say	5	0	0
Horse and hand hoeing, summer and autumn	2	5	0
Cutting out old canes, filling up blanks, digging or ploughing the following autumn and winter, tipping young canes in March	1	5	0
Kent, rates, and taxes	2	0	0
	£20	0	0

As the canes before planting are cut down hard, so as to form strong plants, there is hardly any fruit the first summer, and the second summer the crop is light.

The land is kept clean by horse-hoeing the centres, followed by hand-hoeing against the plants. The cost during the first year is often reduced by growing a crop such as early potatoes between the rows.

The annual cost per acre of cultivating raspberries may be estimated as follows:—

	£	s.	d.
(November) Cutting out old and thinning new canes	0	5	0
Tying up the canes cut out	0	2	0
Taking up spawn	0	10	0
Hoeing out	0	6	0
Manuring (with say 1 ton of wool waste)	3	5	0
Ploughing between rows, 7s. ; digging between canes, 7s. ; (or digging the whole space between the rows by spade, £1 1s. 6d.)	0	14	0
(March) Heading canes off at about 2 ft. 8 in. high	0	2	6
(April) Forking out couch-grass	0	2	0
(April–October) Horse hoeing five times	0	15	0
Hand hoeing, five times	1	10	0
(July and August) Picking, say, 1½ tons, at 3d. per lb.	5	16	8
Carriage to market in gallon baskets and tubs, 1½ tons, at, say, 16s. per ton	1	0	0
Market toll and salesman's charges, at 7½ per cent. on £28 15s. 6d.	2	3	2
Rent, tithe, rates, and taxes	2	10	0
Total cost	£19	1	4
<i>Receipt</i> , 1½ tons at £23... ..	£28	15	0
<i>Balance</i> to cover superintendence, interest on capital for two years (during which there is little return) and profit	£9	13	8

The year's cultivation of the raspberry begins after the picking is finished, the rows are hand-hoed, and as soon as the leaves have fallen the old canes that have borne fruit are cut out near to the ground line, and the new canes are thinned, these thinnings are tied up with string and used by the pickers as fuel. The young plants that have been produced by the parent plant are then dug out. These young plants, or "spawn," as they are called, when taken from young plantations, and of a good variety, may yield a good return, but it is not advisable to allow much spawn to grow, as it takes from the strength of the parent plant, so it is usual to hoe off and destroy most of these shoots unless specially wanted for propagation.

The plantations are usually dunged once in three years, using a truck that is narrow enough to run between the rows without injuring them; if dung is not used, some other manure is probably given each year. It is advantageous for the land to be turned over early in winter to allow the frost to pulverise it. After the winter is over, the canes are headed off to a height at which they are sufficiently strong to hold the weight of the fruit without requiring to be stringed. Between March and October the land is horse-hoed; first with a heavy two-horse hoe, then during the season with one-horse hoes to remove the weeds and form a tilth. If in the early part of the year the land is cloddy, a rib or flat roller is used in the rows. Hand-hoeing is also frequently done in

order to keep the land clean and encourage rooting. When the canes are very luxuriant and there is much fruit, it is sometimes advisable to stake and string the rows.

Picking is done chiefly by women and children, some of the latter being excellent pickers. As the fruit should not be crushed, nearly all raspberries are picked without strigs, whether for sending away in gallon baskets or in tubs for the jam factories. The raspberries are conveyed by van or rail during the night and delivered at the jam factory next morning, as the raspberry quickly ferments when in bulk. A few of the handsomest raspberries are sometimes picked with the strigs for punnets in early morning for sale the same day. The yield per acre may be from three-quarters to two tons. The price of raspberries varies considerably from perhaps £15 up to £30 per ton if scarce. Sent in gallon baskets, they fetch probably a penny per lb. more than in tubs.

The best crops are usually from the plantations between three and seven years old, but plantations last ten or fifteen years if the land is suitable.

In order to check weeds and at the same time add vegetable matter to the soil, I used to sow turnip seed between the rows shortly before picking time when a good tilth had been obtained by hoeing; this made a good cover crop after picking was over, and gave a useful yield of young turnips.

The Gooseberry.—This fruit is regarded as the hardiest and most regular bearer of our fruits. Before planting, the land is well cleaned, dunged, and deeply worked. The bushes are usually planted about 5 ft. apart, or, if large growing kinds, on good soil up to 6 ft.

Mr. Fred Neame, of Faversham, has supplied the actual cost per acre of planting four acres in 1906, which is as follows:—

Cost per Acre of Planting Gooseberries.

	£	s.	d.
Ploughing	1	0	0
Setting out ground for planting $5\frac{1}{2}$ ft. \times $5\frac{1}{2}$ ft.	0	5	0
Cost of 1,512 two-year-old bushes at 9s. per 100 with carriage ..	6	17	6
Planting	0	17	6
Twenty loads of dung at 4s.	4	0	0
Carting out and mulching at 1s. $1\frac{1}{2}$ d.	1	2	6
Total cost per acre	£14	2	6

Mangolds were planted between the rows, and this

helped to pay the expenses of summer work. The price of 9s. per 100 for gooseberries is a very moderate one; 12s. is more usual, and sometimes 14s. per 100 for market sorts. The second year cultivation will probably cost about £4 per acre, exclusive of rent, including 3s. for pruning. The crop the second year may be six half-bushels of green gooseberries. Strawberries are frequently grown with gooseberries for the first four or five years.*

The cost of cultivation would be as follows:--

Annual Cost of Cultivating Gooseberries.

	£	s.	d.
(November) Pruning	1	5	0
Clearing cuttings	0	5	0
Each alternate year 20 tons dung with cartage, £6 11s. 8d.; wheeling on and spreading, 10s.; = £7 1s. 8d. Half cost...	3	10	10
Digging with fork	1	0	0
(April to September) Hand hoeing four times	1	8	0
Picking 2 tons green gooseberries (or 3 tons ripe)	5	0	0
Packing 187 half bushels at 2s. 100 halves... ..	0	3	9
Carriage, 2 tons at 15s. (3 tons at 16s., £2 8s. 6d.)	1	12	0
Sale expenses, 4d. per half bushel	3	2	4
Rent, rates, and taxes	2	10	0
Cost	£19	16	11

Receipt, 2 tons green gooseberries at £12 per ton £24 0 0

Balance, to cover cost of planting, interest on capital, superintendence, &c. £4 3 1

The system of pruning in commercial plantations in Kent is based on the principle that the younger wood bears the largest and greatest number of berries, also that space between the boughs is necessary for convenience in picking and affording light for the production and development of the fruit. The boughs are not usually spur-pruned, though the tips of boughs are shortened and the older boughs cut out so as to keep the bushes with young strong wood. Suckers coming up from the ground or from stems are broken off with the suckering iron, which discourages their growing again, which would happen if pruned by knife. The boughs of the bushes in some plantations spring up direct from the ground, but for convenience in hoeing many growers prefer to have the boughs spring out from a main stem above ground. When making the cuttings for bushes to be grown on a leg, all the buds which would be planted below ground are cut out, and only those to be above ground are left. The disadvantage of being on a leg is that if this main stem is broken the bush is spoilt, whilst if the boughs spring

direct from the ground, new growth of strong young boughs is readily obtained.

The usual plan for picking gooseberries is to make the pickings as thinnings of the berries, picking the largest and leaving the smaller ones; thus for green gooseberries the bushes may be gone over three times if the crop is good. Ripe gooseberries are usually picked all at one picking.

Green gooseberries travel well, and the package and handling is not troublesome, but ripe gooseberries are very tender, and need care in handling and quick sale. A plantation that will yield two tons green will probably give three tons ripe, but it usually pays best to sell them green; green gooseberries are the first fruit picked when labour is plentiful, whereas the pickers are busy with other fruits when the gooseberries are ripe. The crop in Kent usually varies from about $1\frac{1}{2}$ up to 3 tons of ripe berries in mature plantations.

Red Currants.—The cost of planting and first year's cultivation of red currants is approximately as follows:—

	£	s.	d.
(Autumn) manuring with 20 tons dung at 6s. 8d.	6	13	4
Ploughing, twice cultivating, 4 harrowings	2	3	0
Marking out for planting in two directions	0	4	0
(November) 1,743 red currant bushes at 6s. per 100	5	4	7
Digging holes 1 foot square at 5 feet apart, woman carrying bushes, man planting bushes, 1s. 8d. per 100	1	9	0
(April to September) horse-hoeing four times at 3s.	0	12	0
Hand-hoeing four times at 5s.	1	0	0
Rent, rates, taxes, and other expenses	2	10	0
	£19	15	11

The annual cost of cultivation of red currants per acre is approximately as follows:—

	£	s.	d.
(November) pruning	1	2	0
Clearing cuttings	0	5	0
Digging with fork	1	0	0
(April to September) hand-hoeing four times	1	8	0
(August) picking 2 tons of red currants at 6d. per 24 lbs.	4	13	4
Packing 187 half-bushels at 2s. per 100	0	3	9
Carriage, 16s. per ton	1	12	0
Sale expenses, 4d. per half-bushel	3	2	4
Rent, rates, taxes... ..	2	10	0
Cost	£15	16	5
Receipt, 2 tons red currants at £10 10s.	£21	0	0
Profit, to cover cost of planting, superintendence, &c.	£5	3	7

Some fourteen years ago the price of red currants was so low as not to pay for picking and carriage, and a great many
Y Y

acres were consequently grubbed; but since then the price has paid expenses, and they have been moderately remunerative. The red currant is almost always grown as a bush on a "leg" or main stem, with four or five branches often forking at a short distance into two. As the fruit buds are formed close against the older wood, the pruning consists in spur-pruning all the young shoots, and shortening the leading shoot, leaving about one-third of its length. The tendency is to grow red currants with longer boughs than formerly, and thereby get more fruit. Red currants are usually planted $4\frac{1}{2}$ ft. to 5 ft. apart, or perhaps a little wider on very good soil. As with other bush fruits, the land should be well manured before planting, and other crops may be grown for one or two years between the young currant bushes, if care is taken in cultivating and lifting the crop. In order to encourage quick growth the plantation should be frequently hoed.

In pruning the bushes it is important to cut nearly up to the buds to avoid leaving lifeless snags, which harbour the maggots of the Currant Clearwing Fly.

Nuts.—Nut plantations thrive well on the Kentish Rag rock in the neighbourhood of Maidstone and Wrotham. They are said to commence to be remunerative at about six years old, to be at their best production from about the fifteenth to fiftieth year, to yield on an average 7 cwts. or 8 cwts. per acre, worth about £30 per ton, and on suitable soil to last sixty years and upwards.

The approximate cost of planting and cultivation are stated by one large grower, viz., Mr. George Smith, of Loddington, near Maidstone, to be as follows:—

Nuts, with Gooseberries or Currants.

Cost per Acre of Planting.

	£	s.	d.
Ploughing and harrowing	1	0	0
Setting out land for planting	0	3	0
Digging holes and planting (194 holes, 15 feet apart, 18 inches square), taking out soil 6 inches deep, and loosening the subsoil another foot in depth	0	15	0
104 four-year-old Kentish cob nut trees at 20s. per 100	1	18	10
Digging holes, and planting gooseberries or currants at 5 feet apart. 1,548 gooseberries at 12s., currants at 8s. per 100, average, say, 10s. per 100	1	0	0
Mulching nut trees with 4 loads dung with labour	7	14	0
	1	4	0

£13 14 10

Mature Nut Plantation.

Cost per Acre of Cultivation.

	£	s.	d.
(November or December) 1 ton shoddy with labour £3, alternate years, half cost	1	10	0
Digging with fork	0	18	0
(December or January) grubbing out spawn at root	0	3	0
(February) pruning at 10s. per 100 trees	1	0	0
(March) Canterbury hoeing	0	4	6
(April to September) 3 or 4 hoeings	0	16	0
(September) picking (in 3 pickings) 850 lb. at 2s. per 100 lb.	0	17	0
Carriage, say	0	10	0
Commission 7½ per cent. on £14 3s. 4d.	1	1	3
Rent, tithe, rates, taxes	4	0	0
Cost	£10	19	9
Receipt, say, 850 lb. at 33s. 4d. per 100 lb.	£14	3	4
Balance Profit	£3	3	7

The foregoing deals with most of the small fruits grown in Kent. The Loganberry, which is now being extensively cultivated, is a recent introduction.

NOTES ON EXPERIMENTS WITH POULTRY.

EDWARD BROWN, F.L.S., and CECIL A. FLATT.

The following notes describe two experiments which have been made on the College Poultry Farm, Theale, to test new methods, one originating in America and the other in the Transvaal.

CHICKEN BROODERS WITHOUT HEAT.

Where chickens are reared artificially, brooders of one form or another are necessary, and these involve expense for purchase and heating, together with constant attention. Practically one brooder is required for every fifty chickens raised in any season, but, if successful, the result is well worth the labour and expense. An American inventor, however,—Mr. E. W. Philo—claims that artificial heating is unnecessary, and that if the chickens are accommodated in a properly constructed brooder, lamps can be dispensed with. In this he is supported, so far as the warmer months of the year are concerned, by Professor C. D. Davenport, of Cold Spring Harbour, N.Y., who recently stated that his experiments had led him to the conclusion that heatless brooders could be entirely used in America after the end of March.

The construction of the "Philo" brooder is simple, consist-

ing of a box 18 in. square by 10 in. deep. Inside this box, 6 in. above the wooden floor, a light frame covered slackly with flannel is lodged, while a nest of hay is made on the floor. From fifty to one hundred chickens can be accommodated in this box, according to the age and size of the birds. The top consists of a lid in which holes are drilled for ventilation, and an entrance is cut on one side for the chickens, who are thus able to run in and out during the daytime. The brooder is placed inside a brooder coop measuring 6 ft. by 3 ft. and 12 in. high, the sides and ends of which are made of 1-in. matching, while the roof, which lies flat when closed,



CHICKEN BROODER WITHOUT HAT

consists of $\frac{1}{2}$ -in. matching, covered with roofing felt. Resting inside the coop is a light frame, over one half of which flannelette is stretched, the other half being covered with 1-in. wire netting. The frame rests on the two ends, which are made 11 in. high (an inch lower than the front and back), for the purpose of allowing ventilation space at each end between these and the roof when closed. During the daytime the roof is raised and is held in position by the frame named above, forming a gable-top to the coop, the space at each end being filled by triangular frames covered with wire netting. The last-named are hinged to the roof, on to which they fold when the coop is closed.

The entire cost of the materials and fittings is under 20s., and would be much less if a number were made.

Experience with two of these brooders during this season has shown that chickens can be reared successfully without artificial heat, but, as operations did not commence until April 25th, that fact must be kept in view, as it would not be safe without further tests to adopt or recommend for use in the colder weather a system which was successful from May 1st onwards, when the temperature is favourable to chicken rearing. That, however, is part of the natural chicken season, and the question is suggested whether the heat afforded by a hen to her brood is necessary or not. Hitherto we have accepted the former contention, and the entire system of modern artificial rearing has been conducted on that basis.

Certain it is, however, that the chickens raised in the "Philo" brooders have grown steadily and have feathered better than in heated brooders; the mortality has been small, and the birds have been active and healthy. Taking them as a whole, they have not made equal growth with those under heat, though some White Wyandottes have attained greater weights in the "Philo" than others in an ordinary brooder hatched at the same time and fed in the same manner.

Considerable improvements could be made in the brooder and coop, and there is no special advantage in the form adopted. In fact, brooders of the types generally used could probably be made serviceable at a very small expense. It may also be that modifications in feeding would help materially to secure that quicker growth which appears to be the lack of the system, so far as our observations have gone. The method seems to be one which deserves the attention of chicken rearers, as, if generally successful, it would solve some of the difficulties and simplify the work considerably.

EARTH SALTS.

Some time ago communications were received almost simultaneously from Mr. Herbert Ingle, formerly of the Yorkshire College, Leeds, and late of the Transvaal Agricultural Department, and Mr. C. Devonshire, of Barberton, Trans-

vaal, asking if tests could be made on the College Poultry Farm, Theale, of a mixture of mineral salts, which it was claimed had proved most successful for chicken rearing and poultry-keeping in the Colony named. The statement was made that inquiry had revealed the absence of certain salts which are essential to animal life from the soil of South Africa, and that Mr. Ingle, on the suggestion of Mr. Devonshire, had prepared a formula which, when used, had succeeded in preventing that mortality among young stock which is the chief trouble of the chicken breeder wherever artificial methods are adopted. We were unable to make an exhaustive test with laying hens, as that would have been a laborious and costly task, but we were able to make an experiment with growing chickens.

The salts are prepared as follows :—

Formula of mineral salts.						Parts.
Common salt	...	..	..	...	...	30
Phosphate of soda	...	...	...	...	...	9
Calcium fluoride	..	..	...	...	..	1
Ferrous sulphate (green vitriol)	..	...	...	...	...	1
Bone ash	..	...	...	...	..	30
Chalk	...	...	..	...	...	14
Epsom salts	..	...	...	..	...	10
Charcoal	..	...	..	..	...	2
Sulphur, flowers of	..	..	..	...	...	3

100

Two lots of chickens, hatched April 28th, 1909, were selected for trial, namely: Lot I., nine White Wyandottes and seven Buff Orpingtons (one of which died during the first month); and Lot II., thirteen White Wyandottes (one of which died during the first month) and five Buff Orpingtons. These were placed in the same class of brooder, and kept on ground almost devoid of natural food. They were fed in exactly the same manner, except that Lot I. had the mineral salts added to the food, whilst Lot II. had none. In the former case a sprinkling of the salts was added to the morning feed at first and gradually increased. At seven weeks this amounted to $\frac{1}{4}$ oz. per diem, and at eleven weeks to $\frac{3}{4}$ oz. per diem for the entire lot. With the exception of the two which died, the birds kept very healthy, and grew steadily, but did not make rapid growth, owing to the fact that they were not forced and were kept in confinement.

The following table gives the comparative weights attained at four, seven, and eleven weeks old respectively :—

					Average weights.		
At					Lot I. with salts.	Lot II. without salts.	Gain of salt fed.
					oz.	oz.	oz.
4 weeks	...	...	...	...	6'69	5'83	0'86
7 "	...	...	...	...	11'73	10'00	1'73
11 "	...	...	...	...	26'88	20'3	6'58

Dividing them according to breed, the results were as follows :—

					Average weights.			
					White Wyandottes		Buff Orpingtons	
					with salts.	without salts.	with salts.	without salts.
At					oz.	oz.	oz.	oz.
4 weeks	...	...	...	...	6'4	5'9	7'0	5'6
7 "	...	...	...	...	11'0	11'0	12'8	9'6
11 "	...	...	...	...	28 0	20'0	25'3	21'0

With the exception of the second period, when the Wyandottes were equal under both methods, the salt-fed birds showed a considerable gain over the others.

INTERNATIONAL STATISTICAL INSTITUTE.

The Twelfth Session of the International Statistical Institute was held in Paris from the 3rd to 10th of July last. Major Craigie and Mr. Rew officially represented the Board, and there were also present the following British members of the Institute:—Sir Athelstane Baines, Mr. Bowley, Mr. T. A. Coghlan, Dr. Dudfield, Prof. Edgeworth, and Mr. Udny Yule. The total attendance of members of the Institute was eighty-two, representing fifteen countries, and there were also present seventy invited persons (having no voting power) representing fourteen countries. In all, seventeen countries were represented directly or indirectly.

The session was opened by the Minister of Labour, and the Minister of Finance also took part officially in the proceedings. The President of the Republic entertained the delegates at a lunch and a garden party at the Elysée.

Owing to the death of the President, Dr. Von Inama-Sternegg, the Vice-presidents, MM. Levasseur, Lexis, and Troinitzky, presided in turn at the general meetings. On

the last day M. Bodio was elected President, the Vice-presidents and Secretary were re-elected, and Major Craigie was elected Treasurer in the place of Sir A. Bateman, who resigned. Mr. Rew was elected auditor (with M. de Foville) in the place of the late Mr. Hendriks. Among the new members elected was Mr. W. G. S. Adams, of the Irish Department of Agriculture.

The work of the session was divided between four sections, viz.: (i) methods and mathematical statistics; (ii) demography; (iii) economic statistics; (iv) social statistics.

Section I. marks a new departure in the organisation of the Institute, and recognises the increasing attention now being given to the theoretical side of statistical work. English statisticians, as represented by Prof. Edgeworth (who was elected president of the section), and Messrs. Bowley and Yule took a very prominent part in the work of this section. In a valuable paper by Mr. Yule on the application of the method of correlation to problems of social statistics, illustrations were given from the British agricultural statistics, and allusion was made to the work of Mr. Hooker in connection with the development of the uses of correlation as applied to agricultural and meteorological data. Committees were appointed to consider (1) the teaching of statistics, and (2) technical methods of statistical comparison, and Messrs. Bowley, Edgeworth, and Yule were elected members of both.

The work of the demographic section had no special agricultural interest, though a paper by M. Meuriot on "Urban Agglomerations" touched incidentally on a cognate subject, and a committee was nominated to study the question.

In the economic section considerable attention was devoted to the question of returns of the price of cereals. M. Levasseur gave a historical summary of the course of wheat prices in England, France, Belgium, Prussia, Austria, Hungary, Italy, Sweden, and the United States. M. Paisant, Secretary of the Committee on the Sale of Wheat of the Agricultural Syndicates of France, gave an interesting account of the system adopted for the collection of market prices. The Committee on Corn Prices was re-appointed and augmented, its members, now being M. Faure, Sir Athelstane Baines, Dr. Bela Foldes, M. Tisserand, Major Craigie, and Mr.

Rew. The Committee held three meetings, and received communications describing the systems of corn returns in France, Germany, and the United Kingdom respectively. It was resolved to obtain information from the United States and Canada as to official returns of prices in those countries. A suggestion was made that the various governments should be asked to collect and publish returns on a uniform plan, and M. Tisserand submitted a draft form for this purpose, which was provisionally approved.

A report was presented by M. Raffavolich from the Committee on Bounties and Subventions. Enquiries had been addressed to the different governments and a certain amount of information received. It was resolved to continue the inquiry, and to request the various governments each to publish a statistical account of the bounties or subventions which they had granted, or now grant, to agriculture, industry, commerce, and shipping.

Mr. Rew, as Chairman of the Committee on International Fishery Statistics, presented a preliminary report. The Committee was re-appointed and requested to continue its inquiries.

In the fourth section two valuable reports were presented—(1) on a vocabulary of the terms of political economy and statistics and (2) on a technological dictionary, in three languages, of the names of industries and professions. A copy of the first edition of the last-named work, which has been prepared by the French Government, with the aid of a Committee of the Institute, was presented.

A suggestion for the establishment of an International Statistical Office and the publication by the Institute of a periodical statistical bulletin was brought forward by Dr. Van der Borgh and discussed at two meetings of the general assembly. The proposal was referred for examination to a special Committee, consisting of twenty-one members, representing fourteen countries, the British representatives being Sir H. Llewellyn Smith and Mr. Rew.

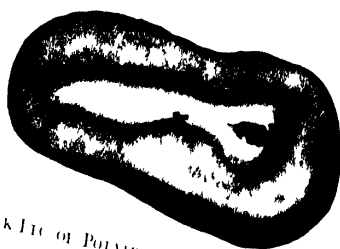
During the past two months the Board's Inspectors have been engaged in inquiries relating to the prevalence of Wart Disease on potatoes in Great Britain.

**Notes on Insect,
Fungus, and other
Pests.**

Up to the time of going to press this work had not been concluded, so that no report can as yet be made, but the present opportunity may be taken to refer to some other potato diseases found on specimens sent to the Board for identification. These specimens were mostly sent up by growers who suspected Wart Disease, and in response to the notice issued by the Board warning all persons concerned of the penalties attached to a failure to report, as prescribed by the Destructive Insects and Pests Order.

Corky Scab (*Spongospora scabies*, Mass).—This disease, which Prof. Johnson prefers to call Powdery Scab (*Spongospora subterranea*, Wallroth), is well known to be of old standing in Great Britain and Ireland, and to be widely distributed. It has been reported to the Board from many parts of Great Britain, chiefly, however, from those parts where Wart Disease is also present, or where it has been suspected. Cases have been reported from Peebles, Stornoway, Forfar, Fife, Lanark, Aberdeenshire, Stirlingshire, Lancashire, Cumberland, Shropshire, Yorks W.R., Staffordshire, Wales, Hereford, Somerset, and Worcester. In Scotland, therefore, the disease seems fairly widely distributed, but in England, as might be expected, it appears to be confined to the west, where the rainfall is higher. It is not, however, to be supposed for a moment that anything like all affected localities are here recorded.

The characteristic that seems to have been noticed by most people who reported is the knobs and swellings on the tuber, giving it rather the appearance of having lopped off limbs. These knobs (not shown in the figure) have, no doubt, been mistaken for the symptoms of Wart Disease, and they have generally been reported as such. The specimens forwarded have, however, exhibited the disease in every stage of intensity from the first, where only a few spots occur that might easily be overlooked, to a late one in which the tuber was exceedingly distorted. Some of these,



BLACK ROT OF POTATOES (*Erwinia phythoea*)



POTATO SCAB DUE TO *Spongioptera abies*, Mass

perhaps the majority, come from Scotland, but two bad cases came from Stoke-on-Trent, and a third from near Taunton.

As regards extension, the worst area reported to the Board was the Hebrides. A writer in the neighbourhood of Stornoway declares that both early and late potatoes were affected, and that the inhabitants, when spoken to about the disease, treated the matter quite lightly, and assured him that the same thing has often been noticed before in wet seasons. New seed, however, brought from Dundee and planted there was not affected. A correspondent from Fyvie reports the disease in a small patch of Ashleaf potatoes in his garden. He believed it had lessened the crop, but he had also noticed it in a very heavy crop of Duke of York. Another correspondent at Strathaven reports a slight attack, "only a few in a pail full." In this case they were growing in a light soil. A third from Coatbridge says fully 75 per cent. of his crop—a patch of British Queen—were affected. A fourth, from Biggar, says, "They are not all like the specimen; some have nothing wrong with them." A writer from Fifeshire says, "They are all over the garden. We had a few last season, but they are very bad this year." The case at Forfar was only in its incipient stage. The Peeblesshire case was fairly bad. The grower had been using the same potatoes for seed for five or six years. Of the Cumberland cases, one at Penrith and one at Carlisle revealed no fact of special interest, but in a second case from Carlisle, the Board were informed that they were grown in a garden very much shaded, where they would get the drip from high trees. The soil is dry, with a stiff subsoil. They were bought from a neighbouring farm, where a large percentage was also attacked, though not so severely.

Eight cases were reported from different parts of Lancashire. In one at Rishton the soil was loamy, with a few ashes in places. The potatoes had not been diseased the year before. At Great Harwood potatoes had been planted in two small plots, one only of which was considerably affected. At Church one lot of Ashleaf was so badly diseased that none were fit for use. The other lots, Scottish

Champion and Up-to-date, were practically all right, having only here and there a potato showing signs of the disease. At Greenfield, near Oldham, however, it was Up-to-dates which were attacked. At Chorlton a small number of potatoes, which had been planted in connection with a Wart Disease experiment, were attacked. The percentage of the whole crop was very small, perhaps a small fraction of 1 per cent, but the scars were very numerous, though small. The soil was light and the variety Conquest, which otherwise had yielded very well. This was the only case reported to the Board from a field crop. Another Lancashire case, also from the neighbourhood of Manchester, showed only a handful of diseased potatoes out of four large bags full.

Only three cases were reported from the West Riding. In one, at Settle, Sir John Llewellyn was the variety attacked. In the other two, from near Sheffield, the kind was not named, but in no case was the attack a bad one. The only two Staffordshire cases came from Stoke-on-Trent. One was trifling, but in the other "the tops all died long before the tubers were ready to get and many were badly diseased. A second bed, with only a walk dividing it from the first, was not affected." They were grown on a heavy soil with a clay subsoil, and the land had been well limed last year. The single Shropshire case occurred at Longnor, near Buxton, and was trifling. One case was reported from Machynlleth, and it was noticed that the haulm was not diseased, while in a garden at Llanidloes one whole bed was affected while other beds escaped. The potatoes from a garden in Anglesea were reported as small, shapeless, and warty, while the leaves and stem looked healthy. The variety was not quoted, but in a case at Hereford the variety was said to be Factor.

Little information could be collected about the other cases. In one near Bath, the crop was very fair, but scattered through it were a good many diseased tubers. In another near Tamworth, Up-to-dates growing in an open plot in a walled-in kitchen garden with trees all round were rather badly diseased. The soil here was very damp and in poor condition, the subsoil being clay. Duke of York and Pink Beauty of Hebron were also said to be complete failures.

At Shipston-on-Stour only four were reported as diseased. Finally, in the case near Taunton, where Up-to-dates were the sufferers, the few that were affected were principally in one place under the shade of a wall and trees, where they did not get much sun.

It appears, therefore, that the conditions under which this disease exists are various. Cases are reported as occurring on light soil and heavy soil, while the disease is said to be found intensively in patches, or scattered throughout the crop. It is undoubtedly of old standing, having been first described by Berkeley over fifty years ago, and is asserted to have caused serious damage at times. It is spread by damp, but in spite of the rainy season this year, and the search that has been made for diseased potatoes in connection with wart-disease, comparatively few cases have been brought to the notice of the Board, and in none of these has the loss proved serious. Growers would, however, be well advised to examine their crop carefully, and reject all tubers found diseased, since, according to Prof. Johnson, the continual planting of diseased sets has led to a great development of the disease in Ireland, and may, of course, do so elsewhere.

Several other potato diseases have been brought to the notice of the Board. These include Violet Root Rot (*Rhizoctonia violacea*, Tul.), which also attacks other plants. The tubers in these cases were generally quite sound, but covered with little lumps that looked like clods of dirt. These generally split off when pressed with the finger-nail, leaving the skin apparently clean underneath. These little lumps, however, were the sclerotia, or masses of compact but dormant mycelium which are capable of spreading the disease if the tuber is planted. The mycelium in this case is only capable of entering the tuber through a wound, but when once it is through the skin, the potato is soon reduced to a pulp. For further information see Leaflet 171. Cases were reported from Derbyshire and Essex.

Another disease, reported from the neighbourhood of Birkenhead, was *Hypochnus Solani*, Pritt. et Delacr. In this case the parasite attacks the haulm just above the

ground level. As a rule, the injury caused is slight, but occasionally, as in the case reported to the Board, the haulm is killed. The tubers, however, are not attacked. Lime should be applied to the infected land.

A much more serious disease was reported from the neighbourhood of St. Helens in Lancashire, namely, Potato Leaf Blotch, a disease well known in Ireland and on the Continent, but not previously recorded in Great Britain. The foliage is the part attacked, the parasite *Sporidesmium solani varians*, Vañha, forming small scattered brown patches on the leaves. These patches gradually increase in size and fuse together, forming large, well-defined blackish patches. Leaves that are attacked become black and die. When the disease appears early in the season, the growth of the tubers is seriously checked. Spraying with half strength Bordeaux mixture is said to check the spread of the disease, if applied on its first appearance. Diseased tops should, of course, be burned, as the winter stage of the fungus is usually present in quantity, and would endanger future crops.

A single case of Blackleg or Potato Stem Rot, caused by *Bacillus phytophthorus*, was recorded in Herefordshire. The potatoes in this case were entirely destroyed in the manner shown in the accompanying illustration. The variety was a pink kidney, Mr. Breeze, which had been grown in the garden for two years. There was no disease in the garden last year, and in another plot, planted this year with seed from the same source, the crop is healthy. Indeed, no similar case of disease has been observed on the holding before. The manure was obtained locally, but other potatoes, manured with the same material, are apparently healthy. The particular plot on which disease occurred had not been planted with potatoes for three years. Unluckily, the case was not brought to the Board's notice early enough to enable them to obtain a photograph showing the effect of the disease on the stem and the relation of the stem to the diseased tuber.

Owing to the very diverse symptoms presented by the material submitted to Kew for examination, under the name of "sprain," it has been found impossible to formulate a diagnosis of the disease.

Report on "Sprain" in Potato Tubers.

Perhaps the most constant symptom is the presence of small, rust-coloured spots, scattered in greater or less abundance throughout the flesh. This appearance agrees with what is known as "internal disease" in the South of England, which, again, possesses many points in common with the disease of apples called "bitter pit," the precise nature of which is still obscure.

In some examples mycelium is present in the tissue of the brown spots, and in such instances, under proper treatment, "winter-rot," caused by *Nectria solani* (Reinke), always develops. On the other hand, in some examples no mycelium can be detected, and however long such specimens are kept under favourable conditions, no fungus appears.

Five tubers said to show "sprain" were planted in the experimental ground at Kew. Each tuber was cut in two, and each one showed rusty patches in the flesh. Three months after planting two of the hills showed no haulms above ground, and, on digging down, the "sets" were found to be almost destroyed by winter-rot. On lifting the remainder at the end of September, the crop produced by four of the "sets" was found to be infected with "sprain"—i.e., the flesh showed small spots of a brown colour. Every tuber was cut and examined, and there was not a single one exempt. The old "sets" of these four roots were in a deliquescent condition, and teeming with the conidial form of winter-rot. The four remaining "sets" produced a perfectly clean crop. The "sets" were shrivelled, but showed no signs of winter-rot.

The above account agrees with what had previously been observed at Kew, namely, that the brown spotting of potato tubers is in some instances an incipient stage in the development of winter-rot, and as it is not at all probable that two distinct diseases presenting similar symptoms—rust-coloured spots—are present in potato tubers, it must be assumed that

in some instances, owing to causes at present unknown, the disease is arrested in its preliminary stage.

Winter-rot in past years has usually manifested itself in pits of stored potatoes, and been but rarely noticed in the autumn. Now, however, it is unfortunately too abundant at the time when the crop is lifted. The unmistakable indications of winter-rot at the time of lifting are the existence of damp, sodden patches of a dark colour on the surface of the otherwise dry, light-coloured tuber. If the disease is at all advanced, the surface of the tuber becomes cracked over the damp areas, and the flesh of the tuber presents a water-logged appearance, and shows rusty patches. As the disease progresses a very offensive smell develops.

Quite recently Mr. Horne* has announced in a preliminary note the constant presence of an obscure organism accompanying "internal disease" in potatoes. The further development of this subject will be awaited with interest.

The Pasteur method of preventive inoculation has rendered great service in preserving stock on badly infected farms in various parts of the world.

**Inoculation for
the Prevention of
Anthrax.**

The method consists in injecting the animals with fixed doses of attenuated cultures of the *Bacillus anthracis*. Two injections at intervals of twelve days are performed. For the first injection a very attenuated culture is used (first vaccin), and for the second a less attenuated culture (second vaccin) is employed. The immunity is established about twelve to fifteen days after the second vaccin has been injected. In cattle it lasts about a year, and should be repeated after this period unless the ground has become purified. The great majority of cattle operated on show little more than a temporary indisposition with passing fever after the injection, which may be assumed to indicate a mild attack of anthrax. Occasionally, however, an inoculated animal may die of the disease as the result of the injection, and for this reason the animals, while undergoing the process of immunisation, should be kept in a special paddock, or, better still, in sheds which can be disinfected

* Horne, A. S., *Ann. Mycol.* Vol. VII., pp. 286-288, 1909.

in the event of an accident taking place. The operation should only be attempted by skilled persons, who will know the best way to prevent an accident, and guard against its consequences should it occur.

Since the operation is not altogether unattended by the possibility of loss, and since it incurs a certain amount of expense, one has to consider under what circumstances it will be worth while undertaking it. It will be obvious that on farms registering only one death annually it will hardly be called for, and that it would be folly to adopt it on clean farms.

It results from observations on several millions of cattle in various parts of the world that accidents occur in about 5 per cent. of the inoculated cattle taken all round, and that the operation may be expected to reduce the death rate from anthrax on infected farms to about 1 per cent. or slightly under. If a stockowner finds that his annual losses from anthrax amount to 2 per cent. he will possibly find it profitable to have recourse to preventive inoculation.

It should be understood, however, that since the number of animals dying of anthrax in one year will vary, and since the inoculation must be repeated annually, the estimation of annual losses must be based on two or three years' casualties.

A certain degree of temporary immunity can also be almost immediately conferred by injecting a dose of anthrax serum, and the injection produces no accidents. Where animals have been exposed to the risks of what might be called gross infection (for example, when a carcase has been carelessly dealt with on a pasture) it is advisable to inject them immediately with serum, and remove them to another field.

At the meeting of the International Dairy Congress, which took place at Buda-Pesth in June last, several interesting papers were read dealing with the influence of food on milk production. **Effect of Food on Milk Production.** Professor Kellner, of the Möckern Agricultural Experiment Station, put forward some interesting reasons for the fact that the feed-

ing of cows can exert only a very limited effect on the composition of the milk produced. He pointed out, in the first place, that the materials entering the milk gland from the blood and lymph vessels become, first of all, an integral part of the gland cells, and the milk is produced only by the disintegration of these gland cells, which are constantly regenerated. These animal organs are fairly steady in their composition, and are not able to utilise foreign substances for building-up purposes, so that the decomposition of the milk gland can only result in a product having slight variations. This comparative constancy in composition is a natural necessity in view of the needs of the calf for whom the milk is intended.

If the composition of the food of a cow exerted any essential influence upon the ingredients of the milk, it might happen, taking into account the various foods which are at the disposal of wild animals, that a milk, rich in protein but poor in milk sugar, would be produced one day, and the next a milk poor in protein and rich in milk sugar. Such variations would be very injurious to the health and development of the new-born animal and would render the continuation of the species precarious.

A similar argument applies to the amount of milk secreted. If the quantity depended upon the nourishment taken, the milk at the disposal of the young, in the case of animals living in the natural state, would be subject to great variations, a circumstance which would not be to the benefit of the progeny.

The uniformity of the milk is secured by the fact that it is not merely separated from the food materials in a mechanical way, but that between the fodder of the mother animal and the milk-forming organs a kind of regulator (the body) comes into operation. If for the time being the fodder is insufficient for the secretion of the proper quantity of milk, the bodily substance of the mother fills the breach caused by the missing food, and is drawn upon for the formation of milk until the body of the mother has become very emaciated. Exactly the opposite process obtains if more be given in the way of fodder than the mother animal can convert into milk. The superfluous matter is conserved in the mother's body as a resource in time of need. This regula-

tion of the quantity of milk upon which the frequency and thoroughness of the abstraction of milk from the udder exerts a very explicable influence is not so exactly carried out that every slight lack of nourishment immediately acts on the body of the milk-yielding animal.

A certain margin is allowed in the amount of milk which an animal can create, within which margin suitably compounded additions to or deductions from fodder affect the production of milk. When the nourishment does not furnish enough material for the formation of milk, the reserve forces of the body are drawn on. When the amount of food is more than enough the production of milk does not keep pace with the increase in the amount of nourishment, so that finally the extreme limit of the productive capacity is reached, and any further increase in the supply of food has no further influence upon the amount of milk secreted.

The limit of productive capacity depends upon the condition of the milk gland, and this is, in a high degree, influenced by the breed, individuality, age, and period of lactation of the animal. The aim of feeders, therefore, must be to suit the amount of nourishment to the productive capacity of the animal, *i.e.*, the quantity and nature of the food must be suited to each animal individually if the greatest advantage is to be obtained.

It is not conducive to the yielding capacity of the milk gland to give a minimum quantity of albuminoids; on the contrary, a certain superfluity should be provided.

The carbohydrates, fat, &c., of fodder are essential for the process of milk formation, since they represent the chief material required for the creation of the milk sugar and milk fat. If a sufficient quantity is not supplied in the fodder, then the fat of the body will be requisitioned for the formation of milk, and when this store is exhausted the milk production will begin to fall off just as when albumen is wanting in the fodder.

The character of the fat in the food has an effect on the composition of the milk fat. Certain foods, such as palm nut cake, cocoanut cake, linseed cake, and cottonseed cake, give a hard consistency to the butter, while oats, maize, wheat, clover, rice fodder meal, rape cake, sesame, and sunflower seed

cake have the contrary effect; but this naturally depends upon the quantity and proportionate richness in fat of the food in question. The fat contents of the food, however, exert no influence upon the proportion of fat in the milk. A high ration of fat reduces, as a rule, the quantity of milk, and from 0.5 to 0.6 lb. of digestible fat per 1,000 lb. live weight in the daily fodder is sufficient.

Professor Kellner also refers to the fact that some food stuffs have the property of influencing, in one or other direction, the amount and the fatty contents of the butter-fat. The first exact investigations which were carried out in this direction, at the beginning of the seventies of last century, with palm nut cake showed that the cake increased the fat contents of the milk by from 0.3 to 0.4 per cent. This effect varied much in individual cases. It was clearly apparent in the case of one cow, but not in the case of others. Since the time mentioned, a great number of observations have been made. Sometimes favourable results, sometimes unfavourable results have been obtained, and sometimes no particular effects at all. The individuality of the animal counts for nearly everything in such cases. Where observations have been made of a number of cows sufficient to average individual cases, the composition of the milk has not been found to be essentially influenced by the food supplied. Investigations in the latter direction have been made for many years by the Experimental Laboratory of the Agricultural High School in Copenhagen, where a mixture of barley and oats has been used as a standard. This mixture was compared with maize in the case of 370 cows; with oil cake mixtures (one-third rape, one-third palm nut, and one-third sunflower cake) in the case of 480 animals; and with beets in the case of 660 cows. In none of these experiments was there any observable change in the composition of the milk as regards its fat contents. There is, however, always the possibility that certain food substances, more particularly palm nut, cocoa nut, and their meals, may increase the fat contents in the case of certain cows in a herd.

Another paper read at the Congress by Professor Böggild, of the Royal Agricultural High School at Copenhagen, referred chiefly to the conflicting views which have been held

at different times as to suitability of different fodders, and he concludes that experience has shown that practically all fodders may be used with advantage if they are wholesome and the cows eat them with relish. The freer the choice given to the farmer the better, as the exclusive use of particular fodders is undesirable, and the practice of feeding cows with a mixture of foods is to be preferred. The main points, in his opinion, are that the cows should be kept in good health, and sudden changes in feeding avoided; and also that great care should be paid to cleanliness and the prevention of contamination of the milk. Given these conditions, the best advice as to feeding is to see that the drinking water is pure and the straw and fodder of good and wholesome composition.

The question of suitable and unsuitable foods was also referred to in several other papers, more especially in connection with the supply of milk for children, a matter which has received great attention on the Continent.

Dr. II. Martel, chief of the Veterinary Service, Paris, gave some particulars as to the regulations in force in this connection in Berlin, Stockholm, and Copenhagen. In Berlin, in addition to general sanitary regulations for dairies producing milk for children, the use of certain materials for feeding purposes is prohibited. In Stockholm the use of vetches, turnips, cabbage, and distillery waste is expressly forbidden. Oil cakes, earth nut, and rape are allowed to the extent of 1 kilo. (2·2 lb.) per head per day, but certain oil cakes are prohibited. In Copenhagen the method of feeding is regulated in the same way by the Sanitary Commission. Dr. Martel observes that hygienic authorities in general are agreed that the waste products of distilleries, breweries, and starch factories should form no part of the fodder of cows the milk of which is intended for the use of children.

The same subject is dealt with by Professor Cselkó, of the Royal Agricultural Academy, Magyarovar, who points out that a review of the literature and practice as regards the foods recommended for feeding cows that produce milk for children reveals many contradictions, and he deduces from this that perfect milk suitable for children may be produced by many kinds of food, and that it is undoubtedly due to

prejudice that so many good foods are held to be of doubtful value for this purpose.

Another speaker, Dr. Otto Fettick, of the Royal Hungarian Veterinary High School, Buda-Pesth, observed that in dairies where the bulk of the produce is intended for market it would be sufficient to ensure that the fodder is not stale, and that a change of fodder, particularly from dry to green, should not be made suddenly, as the best fodder might then give rise to irregularities in the digestive organs and lead to changes in the ingredients of the milk. He thought it might be advisable to prohibit the use of factory waste and stale fodder in dairies producing milk for children.

The general tendency of the foregoing papers appears to be that, in the opinion of several recognised Continental authorities, the effect of food on the composition of milk is less than is often supposed, and that so long as the food is sound and wholesome and compounded in such a way as to keep the cows in thoroughly good health the milk produced is likely to be quite suitable for consumption by children and invalids. The residues from beet-sugar factories, potato distilleries, &c., are, however, regarded as undesirable if not used with great care. The necessity for absolute cleanliness and thoroughly hygienic conditions in every respect is admitted on all hands. *

The annual report on the Distribution of Grants for Agricultural Education and Research for the year 1907-8 [Cd. 4802. Price 10d.], which was

**The Education of
the Farmer's Son.**

reviewed in this JOURNAL, September, 1909, p. 486, deals, among other questions, with that of the education neces-

sary for the young farmers of this country.

General Education.—Occupiers of land, it is pointed out, may be classed as belonging to one or other of two groups, comprising (1) those who have received their general education at the primary schools, or at primary and evening schools, (2) those who have had some higher form of general education, and perhaps the best way of deciding whether the future farmer should or should not attend a secondary school is by answering the question: Is it necessary that he should

take a full share in the manual work of the farm, or will his time mainly be employed in the directing of hired labour?

If a boy is to become a skilled workman, he must begin young, so that, apart altogether from the practicability of sending a lad of this class to a secondary school, the desirability of doing so is open to question. For, by spending time at school when he should be on the farm, there is some danger that his information may be increased at the expense of his efficiency. On the other hand, if later in life the boy is to direct labour, and if he will not be required to work himself, except perhaps at busy seasons, there is less need for manual, and greater need for mental training, and the lad should go to a secondary school.

Education after Attending a Secondary School.—The agricultural education of lads who have been to a secondary school may be obtained either at colleges or winter schools, according to their capacity and their means, but before they attempt to study the principles of agriculture they should undergo an apprenticeship of from one to three years on the holding of a practical farmer.

There are two reasons for this recommendation. Even if the farmer is not obliged to undertake manual labour himself, he should, while young, make himself familiar with all the common operations; he must learn to drive horses, to handle a plough, to sow corn, to build and thatch stacks, to attend to live stock, and to adjust all ordinary farm implements. At twenty he is too old to begin to learn, and he will seldom be a satisfactory manager of farm labourers if he has not made a beginning when he is sixteen or seventeen. The second reason is that a lad who has been a year or two on a farm learns much more while attending agricultural classes than a boy who comes straight from school. The latter has an advantage in certain subjects, but nearly all teachers are agreed that although he has forgotten some of his school work, and at first may be somewhat slow in assimilating information, the boy from the farm derives much more benefit from his studies than the boy who has just left school.

So marked is the difference that one of the best known and most successful of all agricultural colleges, the Guelph College, Ontario, will not admit pupils unless they can produce

"certificates of having spent one year at work on a farm," and similar requirements exist in the agricultural colleges of Denmark, the winter schools of Holland and many of the agricultural schools of Prussia.

The best type of agricultural institution for the lad who has been to a secondary school will vary with the circumstances of the individual. Farmers' sons should, as a rule, spend the summer months at home, and they are, therefore, likely to benefit most by winter courses given either at colleges or winter schools; but town-bred lads who are studying agriculture should attend institutions having a summer term, during which practical agriculture may be studied on the college farm. Even for the sons of farmers, study during the summer term offers advantages which in a good many cases may outweigh the advantages gained by spending the summer months in farming.

Education after Attending a Primary School.—Two courses are open in the case of those future occupiers of land whose circumstances do not permit of attendance at secondary schools, they may either obtain their agricultural instruction between the ages of fourteen and eighteen in connection with evening continuation schools, or they may do so later, when from seventeen to twenty-three, at winter agricultural schools and classes conducted by special instructors.

Evening Continuation Schools.—The recommendation that a young farmer should not study agriculture until some years after leaving the primary school does not mean that he is to have no education at all between the ages of fourteen and seventeen, nor does it mean that no reference to agriculture should be made in ordinary evening schools. On the contrary, it is of the highest importance that there should be good continuation schools in country districts, and that full use should be made in them of any agricultural facts or principles which the teacher may be able to handle effectively and which may be adapted for pupils of the age under instruction.

The mistake which must not be made is that of supposing that if the circumstances of the lad compel him to begin work at fourteen the only further education he can, or should have, must take the form of technical instruction. While it is the

case that setting a lad to work at an early age may hasten the formation of practical instincts, the normal course of mental development is not materially altered. The boy is no less a boy because he happens to be working on a farm instead of in a secondary school, and when he is not fortunate enough to belong to the class which can afford a secondary school education the best thing that can be done for him is to continue his general education by means of evening schools. Unless a foundation of general education has been laid at the evening school, the special instruction given at winter agricultural schools must lose much of its value. The marked success of agricultural instruction in Denmark must be ascribed to the fact that so many of the pupils first attend the People's High Schools.

In the interests of agricultural education it is fortunate that the subject of evening schools is now engaging so much attention, and it is to be hoped that their value will not be lessened by an attempt to make them too technical. Agriculturists are in danger of laying overmuch stress on the value of technical instruction for lads between the ages of 14 and 17. The farmer, who is anxious that his son should have the best education which he can afford, asks that the boy shall have "practical" teaching, and it is somewhat difficult to convince him that the teaching of agriculture at this age is really a very "unpractical" method of attaining his object. There are, of course, certain processes, such as butter-making or seed-testing, which are well adapted for rural evening schools, but the study of most agricultural subjects should come later, when the lad is old enough to appreciate the information which the skilled agricultural instructor tries to convey to him.

Winter Agricultural Schools and Classes.—The young farmer is ready for special instruction in agriculture as soon as he has become familiar with the ordinary work of the farm and has begun to interest himself in its management; he now feels the need of gaining further information about the management of soils, crops, and live stock; he wishes to know about the practice of agriculture in other districts, about the purchase of manures and feeding stuffs, and the manufacture and marketing of produce. Such information

can only be given by special instructors, and it would best be given in systematic courses at winter agricultural schools; but until schools are available local classes must take their place. Even when schools have been provided, winter classes would have to be conducted for the benefit of those who could not attend a school.

Local Lectures.—In some respects the local class must be regarded as a makeshift for the more systematic course of the winter school; but classes held by itinerant instructors have another and more appropriate purpose. The education of the farmer is not completed when he leaves the agricultural college or the winter school. In an art like agriculture new systems are always receiving trial, new manures and feeding stuffs come into use, new varieties of crops are being raised, and the farmer must be kept informed of these and similar subjects which are likely to assist him in improving his methods.

If then we review the educational needs of the future occupier of land, we find that whether he is to be a large farmer or a small holder two types of instruction are called for; in the first place there must be the means of giving him general education, either in secondary schools or in evening schools, until he is about 17 years of age, and later, when he has reached the age at which he begins to ask for information, special instruction in agriculture must be provided. In the case of the young farmer of from 17 to 23 special instruction should take a systematic form, and can best be given at agricultural schools or colleges; but after the farmer has settled down on a farm of his own the instruction must be such as can be given at local classes.

The Report of the Land Division of the Board of Agriculture and Fisheries for 1908 has been issued in two parts.

**Report of the
Land Division.**

Part I., of which a summary has been given in this JOURNAL (October, 1909, p. 575), dealt with the proceedings under the Small Holdings Act, while Part II. describes the proceedings of the Board under the Allotments, Universities and College Estates, Improvement of Land, and certain other Acts. (Cd. 4,895, price 8½d.)

In accordance with section 59 of the Small Holdings and Allotments Act, 1908, the Board have called for returns of the proceedings of every Town Council, Urban District Council, and Parish Council in relation to allotments during the year 1908, and the opportunity has been taken to obtain information as to the total quantity of land which has been purchased or hired by Councils for allotments. The information received from those Councils who have forwarded returns is tabulated in the Appendix to the Report.

The total quantity of land held by Councils in England and Wales on December 31st, 1908, for the purpose of allotments was 17,529 acres, of which 3,478 acres had been purchased and 14,051 acres hired. The actual quantity let in allotments amounted to 16,809 acres, and the number of tenants to whom it was let was 58,648 individuals and two associations: the average size of each allotment is therefore about 1r. 6p.

The number of applications received for allotments during 1908 was 21,540, and the total quantity applied for was 15,695 acres. There were 18,366 applicants for not more than one acre each, the total quantity applied for being 4,779 acres, while there were 3,169 applicants for allotments exceeding one acre and not exceeding five acres, and the quantity applied for by them was 10,806 acres. No obligation is imposed on allotment authorities by the Act to provide allotments exceeding one acre, and accordingly a considerable number of the applications for such allotments were referred to the County Councils to be dealt with as applications for small holdings.

The number of applicants in England and Wales who have been provided with allotments by local authorities during 1908 is 6,147, of whom 2,002 have been provided for by Parish Councils, 1,606 by Urban District Councils, and 2,539 by Town Councils. These figures include all those persons who have been accommodated with allotments on land which was in possession of the Councils prior to January 1st, 1908, when the Small Holdings and Allotments Act, 1907, came into operation, as well as on the land which was acquired by Councils under that Act during the year 1908.

SUMMARY OF AGRICULTURAL EXPERIMENTS.

EXPERIMENTS WITH LIVE STOCK.*

Summer Feeding of Dairy Cattle (Lancs. C.C. Farmer's Bull. No. 9).

—The object of this experiment, which was carried out in the summer of 1908, was to compare equal weights of undecorticated cotton cake and decorticated cotton cake as supplementary foods for dairy cattle on grass. Two uniform lots of five cows each were chosen, and Lot I. was given 2 lb. undecorticated cotton cake, and 2 lb. maize meal, while Lot II. was given 2 lb. decorticated cotton cake, and 2 lb. maize meal. The cost of the undecorticated cotton cake was £5 9s., and of the decorticated £7 19s. 6d. per ton. At the end of four weeks the feeding was reversed, Lot I. receiving decorticated and Lot II. undecorticated cotton cake. The change was made gradually in order to allow the cows to become accustomed to the new diet, and a fortnight intervened between the first and second period of the experiment. The cows fed on undecorticated cotton cake gave a slightly heavier yield of milk than the others, and owing to the difference in cost of the two cakes, the estimated profit was decidedly larger in the case of the cows fed on undecorticated cake, though this balance would be reduced if the smaller manurial value of the latter cake were taken into consideration. The cows of Lot I. showed a greater gain than those of Lot II. in the percentage of fat in the milk during the first month, and also during the second month when the feeding was reversed, showing, as has been noticed previously, that the individuality of the cow has much more to do with the percentage of fat than has the kind of food given. For butter-making the decorticated cotton cake was more satisfactory, but for cheese-making the two foods were equally satisfactory.

Feeding of Cattle and Sheep (Univ. Coll. of N. Wales, Bangor, Bull. 10, 1908).—In this experiment the feeding value of decorticated cotton cake was compared with that of the same weight of undecorticated cotton cake and linseed cake, mixed in equal proportions. Two lots of four bullocks received as much as they cared to eat of pulped roots and chaffed hay and straw, with a little long hay every evening, the average quantity consumed being 70 lb. of swedes, $7\frac{1}{2}$ lb. of hay, and $7\frac{1}{2}$ lb. of straw. In addition the animals in Lot I. were given 3 lb. decorticated cotton cake and 3 lb. maize meal, while Lot II. received $1\frac{1}{2}$ lb. undecorticated cotton cake, $1\frac{1}{2}$ lb. linseed cake, and 3 lb. maize meal. These quantities were given from December 9th to January 10th; from January 10th to January 30th the quantities were increased to 4 lb. of cake and 4 lb. of meal per head, and from January 30th to February 18th, they were raised to 5 lb. of each per head. The difference in the increase of live weight produced by the two systems of feeding was small, but there was a balance in favour of decorticated cotton cake, without taking into account its higher manurial value.

* The summaries of Agricultural Experiments which have appeared in the present volume have been as follows:—Experiments with Cereals, April, p. 65, and May, p. 150; Experiments with Root Crops, June, p. 239, and July, p. 311; Experiments with Potatoes, July, p. 313, and August, p. 402; Miscellaneous Experiments, August, p. 405, and September, p. 489; Experiments with Clover and Grass, October, p. 589.

A similar trial was carried out with sheep, thirty mountain wether lambs being selected and divided into two lots of fifteen each. Thirteen lb. of swedes and $\frac{1}{2}$ lb. of clover hay per head were given daily to both lots, while in addition Lot I. received $\frac{1}{2}$ lb. decorticated cotton cake and $\frac{1}{2}$ lb. split maize per head, and Lot II. $\frac{1}{2}$ lb. undecorticated cotton cake, $\frac{1}{2}$ lb. linseed cake, and $\frac{1}{2}$ lb. split maize. The experiment lasted from December 9th to February 19th.

The result was very similar to that of the cattle-feeding experiment. The fifteen lambs in Lot I., which were fed on decorticated cake, showed a total gain in weight of 12 lb. more than the lambs in Lot II., which was equal to a net gain of 1s. 5d. after deducting the extra cost of the cake.

Feeding Experiments with Cattle and Sheep (Northumberland Educ. Committee, Bull. 12).—A review of these experiments, in which the equivalent feeding value of different foods was tested, was published in this *Journal* for March, 1909, p. 931.

Feeding of Cattle, Sheep, and Pigs (Journ. South-Eastern Agric. Coll., No. 17, 1908).—An experiment was carried out with cattle to investigate the possibility of replacing roots in a fattening ration by one of the treacle foods, in this case Molascuit, which contains 45 per cent. of sugar, with sugar-cane residue as the absorbent material. Ten bullocks of five different breeds were divided into two lots, and fed with linseed cake, Bombay cotton cake, rice meal, chaffed straw, and hay, in quantities varying according to their age, and Lot I. received 35 lb. or more of roots daily, while the other five received $2\frac{1}{2}$ lb. or more of Molascuit, i.e., at the rate of 1 lb. instead of 14 lb. of roots, this being the relative value of the two foods. The experiment requires corroboration, as two of the animals receiving Molascuit were bad doers, but it indicates that roots cannot economically be replaced by Molascuit during the whole feeding period. Molascuit seemed to give very good results during the first two months of the feeding period, but in "finishing off" the roots apparently produced a firmer and less watery beef.

A record is also given of the daily gains in live weight of the cattle and sheep kept on the College farm. In connection with the former it is noted that five fattening cattle, although given a more expensive ration than those in the above-mentioned experiment, made a smaller gain in live weight. Attention is drawn to the importance of economy in this respect, so as to avoid giving the animals more cake and meal than they can profitably utilise, more especially when the remainder of the diet, grass or hay, is naturally good.

An experiment in calf feeding was undertaken to see whether cottonseed oil could be used as a cream substitute, to be used with separated milk. This oil is cheaper than cod-liver oil, and is free from objectionable odour. One lot of calves, eight weeks old, received nine quarts of new milk daily, which was gradually decreased by substituting linseed cake gruel, until the fourth week, when they were receiving four quarts of new milk daily. The second lot received nine quarts of separated milk after the first week, with from one and a half to three tablespoonfuls of cottonseed oil. Hay and ground linseed cake were also fed to all the calves. The experiment lasted $5\frac{1}{2}$ weeks, and the live

weight increase per head of both lots during that period was practically the same. The cost of the food given to Lot I. (new milk) was 34s. 1d. per calf, while that given to Lot II. (cottonseed oil) was 10s. 4½d. The calves in Lot II. appeared to thrive well, and the cottonseed oil did not produce either scouring or the opposite effect. This oil, therefore, appears to be a useful cream substitute, though its suitability for younger calves, which were not available, has not yet been tested.

A mixture of treacle and malt culms was also tried as a milk substitute, but proved unsatisfactory.

An experiment was made to compare rice meal with barley meal for pig-fattening purposes, rice meal being selected on account of its relative cheapness compared with other foods. It was bought at £5 15s. per ton, barley meal and middlings being £6 5s. to £6 10s. per ton.

Two lots of five pigs twelve weeks old were selected, one lot received barley meal only, and the other a mixture of barley meal and rice meal, the proportion of rice meal being gradually increased from one quarter to three quarters. The lot receiving rice meal did very badly; and this food, when used with water, does not appear suitable, at any rate for young pigs, as it is not sufficiently rich in nitrogenous matter. It has been shown to be suitable when fed with a highly nitrogenous food, such as separated milk. The experiment was continued with the same pigs, but the ration of each lot was reversed; the result showed that rice meal was unsuitable by itself for pigs up to five months old.

Winter and Summer Calf Rearing (Journal of Dept. of Agric. for Ireland, Vol. IX., No. 4, July, 1909).—An account is given of two calf-rearing experiments which were conducted with the object of showing whether the winter or summer rearing of calves was the more profitable. Five calves dropped in November were kept for twelve months, and sold on December 1st, while five calves, dropped in April, were kept for a little over thirteen months, and sold in May. The November calves were sold for £37, which after allowing for all expenses, including attendance, insurance and interest, left a balance for profit of £2 5s. 8d. The April calves only fetched £32 10s., while the total expenditure was £36 12s., so that there was a loss of £4 2s., or 16s. per head. The higher cost of the keep of the April calves was due to the large quantity of hay consumed; they also consumed more roots, but less calf meal, cake, and crushed oats, than the winter lot. The winter calves were more thrifty and better growers than the April lot, and in this they confirmed the general experience that early calves are easier reared and better thrivers than late calves. The separated milk consumed was charged for at 1d. a gallon, but if this were omitted from the expenditure the balance left for profit from the November calves would be £7 os. 11d. This would be equal to a return of 1½d. per gallon for separated milk when used for feeding winter calves. In the case of the April calves, the balance, after omitting the separated milk, would be only 15s., which is equivalent to a return of about ½d. per gallon for separated milk when used for feeding April calves. In other words, separated milk was nine times more valuable when used for feeding November calves than when used for feeding April calves.

The other experiment was carried out on similar lines on a different farm, and pointed to the same conclusion.

Feeding of Cattle and Pigs (Univ. Coll. of Wales, Aberystwyth, Rept. on Expts., 1907-8).—The object of the experiment with cattle was to compare the value for fattening purposes of moderate and large quantities of concentrated food. A set of eight Welsh black cattle, and another of six Shorthorns, were divided into two lots each, Lot I. in each case being fed on the following daily ration per head:—5 lb. chopped straw, 10 lb. hay, 50 lb. roots, 3 lb. of Bombay and Egyptian undecorticated cotton cake in equal proportions, and 3 lb. barley meal; Lot II. received the same quantities of straw, hay, and roots, with 5 lb. of the mixed cake and 5 lb. of barley meal. The former ration cost 5s. 8d. per head per week, and the latter 7s. 1d.

In the case of the two-year-old Welsh cattle, Lot I. showed an average gain in four months of 1 cwt. 42 lb., while Lot II. gained 1 cwt. 36 lb. The yearling Shorthorns gained 1 cwt. 38 lb. (Lot I.), and 1 cwt. 39 lb. (Lot II.) in three months. The results, therefore, from the two lots were practically identical in each case, Lot I. doing just as well on 6 pounds of concentrated food as Lot II. on 10 pounds. When allowance is made for the cost of the food and the manurial value, Lot I. of the Welsh cattle showed a profit of 11s. 2d., and Lot II. a loss of 14s. 11d. per head. In the case of the Shorthorns there was a profit of 44s. 9d. and 26s. 4d. per head respectively.

These experiments with two different sets of cattle are of considerable interest, and show, as was pointed out in the experiments at Wye referred to above, that it is a mistake to assume that cattle will do better on a heavy ration than on a moderate one.

In the experiments with pigs, cooked and uncooked potatoes were compared, to ascertain if the trouble and expense of cooking potatoes for young pigs were justified by the better results obtained. Two tests lasting from 6 to 8 weeks each were made, one with pigs 8 weeks old, and the other with pigs 10 weeks old. The daily rations were 2½ lb. potatoes and 2 lb. mixed barley and maize meal, in one case the potatoes being cooked, and in the other case merely pulped in their raw state. The total increase in the first experiment was 154 lb. with cooked, and 123 lb. with uncooked potatoes; in the second experiment it was 127 lb. and 108 lb. respectively. If a deduction of 1s. per week is made for the cost of cooking, the advantage in the first experiment would be only 1s. 5d., or 3½d. per pig, while in the second experiment the value would be the same in both cases.

With pigs which are intended for the butcher at about 4 months old it may be said, therefore, that cooked potatoes give, as a general rule, a greater increase in live weight than uncooked ones, but that when allowance is made for the cost and trouble of cooking it may be more profitable to use uncooked potatoes. In any case the difference between the two methods of feeding may be so small as to be almost negligible.

Breeding of Sheep (Univ. Coll. of N. Wales, Bangor, Bull. I., 1908).—These breeding experiments in the production of cross-bred lambs from Welsh mountain ewes have been in progress since 1900. In 1908 125 draft ewes were divided into five lots and mated with Southdown, Wiltshire, Dorset Horned, Ryeland, and Kerry Hill rams. The weights of the lambs produced, and the dates when they were sold are given in the bulletin. Professor Winter observes that the most

successful cross in 1908 was the Kerry Hill. The lambs of this cross fattened so readily that 80 per cent. of them were included in the first sales. The advantage usually gained by early fattening was very marked in that year, as prices suffered such a drop after the beginning of August that lambs became almost unsaleable. In point of weight the lambs of the Kerry Hill cross were almost equal to the heaviest of the other crosses. The Dorset Horned cross reached heavier weights than any of the others, but did not fatten so readily as in the previous year. It is considered that better results with this cross would be obtained on land superior to that at Madryn.

Sheep Breeding Experiments (Northumberland C.C., Guide to Expts. for 1909).—The results obtained in the four years, 1904-7, by using an Oxford Down ram and a Border-Leicester ram on half-bred ewes are compared. Professor Gilchrist concludes that, so far as the production of fat lambs is concerned, the Oxford Down ram has given slightly better results than the Border-Leicester ram, while when the lambs were kept till they were shearlings the Border-Leicester ram has been distinctly superior.

Expts. with Sheep (Cumberland and Westmorland Farm School, Twelfth Annual Report, 1908).—A comparison was made between lambs of the Border-Leicester—Black-faced, and the Wensleydale—Black-faced crosses. Twenty good store lambs of each cross were purchased and placed on swedes in December. After two months' feeding on similar quantities of swedes, hay, linseed cake, and oats, they were all fat, the Wensleydale cross having gained 256 lb., and the Border-Leicester 282 lb. The disposition to fatten was therefore slightly in favour of the latter, but the Wensleydale fetched about 9d. a head more.

As regards crossing for fat lambs, cross-bred ewes were put to Border-Leicester and to Oxford Down rams, and the lambs got by the Oxford Down ram matured quicker and sold at a better price than those by the Border-Leicester ram.

FOREIGN AND COLONIAL EXPERIMENTS

Milking-Machine Experiments (Wisconsin Agricul. Expt. Stn. Bull. 173).—Recent investigations and improvements in milking-machines have attracted attention among dairymen in America owing to the need of some method for reducing the labour of milking. Careful tests have therefore been carried out at the Wisconsin Expt. Stn. to determine the efficiency, economy, and influence of the milking-machine both as used experimentally and by practical dairymen. These trials were made with the Burrell-Lawrence-Kennedy milker for 20 months with 29 cows in the University herd. Forty separate trials were made, and cows were milked continuously by the machine for periods of from 4 to 62 weeks, or an average of 26 weeks.

The effect and efficiency of machine-milking on the cows was in general beneficial, most of the cows standing well, and showing little shrinkage when the change of hand to machine-milking was made, with practically the same average decrease in production as when hand-milked. Comparison with preceding periods of hand-milking for the same cows showed approximately the same average production. Stripping by hand after machine-milking was found, however, necessary in some cases.

The economy of machine-milking is due to a saving in the time and labour necessary to milk a large herd. About five minutes per cow is saved where four cows are milked at once and more time when one man operates three machines milking six cows at one time. The cost of operating two machines by electric motor was about 2d. per hour.

The bacteriological examinations showed that the germ content was slightly decreased and the keeping quality of the milk was somewhat improved by machine-milking. Veterinary examinations showed no appreciable effect on the udders or the general health of the cows, as a result of machine milking.

The experiences of 41 dairy farmers, covering periods of one month to over two years, indicated that a majority of them were favourable to the machine. Some 27 reported favourably, eight were undecided, and six were unfavourable.

The conclusions reached by the writers of this Bulletin are that the success of machine-milking depends largely upon the man operating the machine. In herds of 30 cows or more machine-milking is both practical and economical, and the machine itself seems durable and efficient, provided it is properly cared for by an efficient operator.

The necessity for efficient working is strongly emphasised, and it is stated that the adoption of machine-milking with the present development of the machine, can only be recommended under conditions where the farmer is able to give personal attention to the operation of the machine, or has reliable intelligent help who can and will follow the directions of the manufacturer as to care of the machine, manipulation of the udder, stripping the cows, &c.

Where such is the case the milking machine can be recommended for the general dairy farmer who has a large herd, or for farmers owning smaller herds, *e.g.*, 30 head or perhaps less, who will be able to attend to the milking of the herd, alone or with the help of a boy, by means of the machine, and thus avoid keeping extra help for this purpose. The milking machine is not definitely recommended for pure-bred herds where the maintenance or the development of a maximum dairy production in the cows is of vital importance, although it is believed that under favourable conditions it may also prove of value in such herds.

OFFICIAL CIRCULARS AND NOTICES.

The Board of Agriculture and Fisheries have addressed the following circular letter to local authorities in Great Britain :—

SIR,—I am directed by the Board of **Ordnance Survey Maps.** Agriculture and Fisheries to inform you that a general revision of the Ordnance Survey maps on the scale of one inch to a mile and on smaller scales, takes place at intervals of 15 years, and that, except in the case of railways, changes which take place after such a revision have not hitherto been shown on the maps until after the next general revision of the district. The Board propose, however, in the future to include in the maps any important additions, alterations or corrections in the case of other detail, such as the construction or demolition of main roads, canals, bridges,

and other works affecting communications, and the erection of large engineering works and other buildings of importance, without waiting for the next general revision to take place. The Board would be obliged if your Council could see its way to instruct any of its officers, who may be cognisant of such changes, to inform the Director-General of the Ordnance Survey, Southampton, when any change occurs of sufficient importance to be shown on a scale of one inch to a mile.

I am, &c.,

T. H. ELLIOTT,
Secretary.

The Board have addressed the following circular letter, dated September 22nd, 1909, to County Councils and County Boroughs in England and Wales :—

SIR,

**Repayment of
Expenses under the
Small Holdings Act.**

I am directed by the Board of Agriculture and Fisheries to say that certain points have arisen in connection with the repayment by the Board of the expenses of County Councils and the Councils of County Boroughs under the Small Holdings and Allotments Act, 1908, on which they think it desirable to communicate with you.

It appears to the Board that the Councils' expenses of proceedings under the Act—other than payments for purchase money, rent, or compensation—may be divided into four main heads, viz. :—

1. Expenses of ascertaining the demand for small holdings.
2. Expenses of proceedings in relation to the acquisition of land for small holdings.
3. Expenses incurred after the land has been acquired, or agreed to be acquired, in connection with the preparation of schemes and the adaptation, sale, or letting and management of the holdings.
4. Expenses, such as those incurred under Sections 19 and 49 of the Act, which are not connected with the provision of small holdings to be sold or let by the Council.

Under the Treasury minute of 19th October, 1908, the Board repay half of the expenses under the first head incurred before the 1st April, 1910, and under Section 21 of the Act and the Board's Regulations of 18th March, 1908, they repay the whole of the expenses under the second head, while those under the third and fourth heads are not subject to repayment by the Board. Expenses incurred under the third head should be treated as part of the costs of the scheme and recouped out of the rents. Those incurred under the fourth head are clearly distinguishable from the others, and may, therefore, be disregarded for the purpose of this letter.

I am, therefore, to suggest that your Council should submit to the Board, if it has not been done already, a detailed account showing the whole of their expenditure under the Act up to the 31st March last under the heads of salaries, travelling expenses, fees to valuers, &c., office expenses, printing, advertising, stationery, postage, and other expenditure stated separately, and that the total expenditure under each of these heads should be apportioned between the three main heads of

(1) ascertaining the demand, (2) acquisition of land, and (3) management and preparation of schemes, &c.

Specimen forms of account A. and B. for this purpose are enclosed herewith.* The Board would be glad if your Council would render accounts under the Act in the manner indicated in these forms, so far as circumstances permit.

The Board will then be in a better position to consider whether the proposed apportionment is a reasonable one, and they will be able to repay at once the expenses incurred in relation to the acquisition of land, leaving the repayment of half of the expenses of ascertaining the demand to be made when the accounts have been audited and a properly certified claim can be made in accordance with the Treasury Minute of the 19th October, 1908.

I am to request that all accounts of expenditure and claims for repayment may be sent to the Board in duplicate, and as the Board are required to furnish to the Comptroller and Auditor General the original vouchers for the items in respect of which they make a repayment, I am to request that the vouchers for the payments may, as far as possible, be sent to the Board with the claim, the absence of a voucher in any case being explained by a note on the account. Where a portion only of a charge is repaid by the Board the voucher will be returned on application if it is further required for county or borough purposes.

Where a salaried land agent or other officer has been specially appointed by the Council to deal with work under the Act the apportionment of the salary actually paid should be made on the basis of the proportion of time which has been spent on the three above-mentioned classes of work, viz., ascertaining the demand, acquisition of land, and management, &c., travelling and other expenses of a general nature being apportioned in like manner when it is not possible to make a more exact apportionment.

As was indicated in the Board's circular letter of the 24th April, 1908, they will be prepared to repay the conveyancing expenses in connection with the acquisition of land, and these will include, in the case of purchases, the stamp duty and the scale charges of the Clerk or other officer of the Council where he acts as their solicitor, and is entitled to charge the Council for investigating the title, preparing and settling the draft conveyance, and completing the purchase. The fees payable on registration of the land with a possessory title and the legal expenses in accordance with the Land Transfer Rules will be treated in the same way. The Board do not regard the employment of a solicitor to negotiate purchases and leases as a necessary expense for the Council to incur, whether the solicitor is Clerk to the Council or not, and they are, therefore, not prepared to repay negotiation fees unless the circumstances are exceptional. With regard to vendors' costs the Board are of opinion that, in view of Section 82 of the Lands Clauses Consolidation Act, 1845, and of the judgments in the case of *In Re Burdekin* (64 L.J. Ch. 561), a Council can, in the case of a voluntary purchase otherwise than at auction and in the absence of some provision as to costs in the contract, be called upon to pay the

* Not printed.

vendor's costs of conveyance, deducing, evidencing and verifying title and furnishing abstracts and copies. This being so, the Board think that a vendor's solicitors' costs may be treated as part of the expenses incidental to the acquisition of the land and they will be prepared to repay them accordingly. The Board think that Councils would do well to negotiate purchases on the basis that the vendor's scale costs under Schedule 1 of the General Order under the Solicitors' Remuneration Act, 1881, will be repaid by the Council, as such arrangements may weigh with a landowner in considering an offer made by the Council. In the case of sales at auction it is not uncommon to provide that the purchaser shall, in addition to his purchase money, pay part of the auction fees and solicitor's charges. These conditions apply to all purchasers and such expenses should therefore for the purposes of this question be treated as part of the consideration or purchase money and will not be repayable by the Board. In the absence of any decision to that effect the Board are not prepared to treat Section 82 of the Lands Clauses Consolidation Act, 1845, as being applicable to sales at auction, and if in any sale at auction the vendor should claim that his costs are payable under that section the Council should communicate with the Board with a view to the claim being contested.

In the case of land which is acquired on lease the lessor seems to be entitled to claim that his conveyancing costs shall be paid by the lessee and such costs will be repaid by the Board together with the stamp duty and the scale charges for perusing and settling the lease and completing.

The Board find that vendors and lessors sometimes stipulate in their negotiations with a Council for payment of expenses they have incurred but which in the absence of agreement they would be unable to recover from the Council. The Board will not in ordinary cases repay these payments as they regard them as part of the consideration for the acquisition of the land. In cases where the vendor has to obtain the consent of the Ecclesiastical Commissioners or the Charity Commissioners and asks the Council to agree to pay in any event the cost of the report required by the Commissioners to enable them to consider the matter, the Board are willing to repay the cost of the report if the Council agree to the vendor's proposal.

The cost of ascertaining the compensation for tenant right payable to an outgoing tenant should, as a rule, be treated as part of the compensation and will not be repaid by the Board.

I am, &c.,

T. H. ELLIOT,
Secretary.

The Board have addressed the following circular, dated October 12th, 1909, to Local Authorities in Great Britain on the subject of the wording of certificates under the Fertilisers and Feeding Stuffs Act, 1906:—

**Circular as to
Fertilisers and Feeding
Stuffs Act, 1906.** **SIR,—**

I am directed by the Board of Agriculture and Fisheries to inform you that they have observed "that in some cases the certificate or copy certificate of

the Official Agricultural Analyst relating to a sample which has been divided into parts, in accordance with Section 3 (3) of the Fertilisers and Feeding Stuffs Act, 1906, does not contain the words "The analysis was made in accordance with the Fertilisers and Feeding Stuffs (Methods of Analysis) Regulations, 1908," as required by Regulation No. 6 of those Regulations.

The Board are advised that the omission of these words from the certificate might cause the failure of a prosecution under the Act.

I am, therefore, directed by the Board to ask you to be good enough to call the attention of the Official Agricultural Analyst for the district of your Local Authority to the necessity for following the prescribed methods of analysis in analysing samples sent to him in duplicate, and for inserting in certificates relating to such samples the statement referred to above.

I am, &c.,
T. H. ELLIOTT,
Secretary.

The Board have addressed the following circular, dated October 1st, 1909, to Local Authorities in Great Britain, on the subject of the adulteration of cream:—

**Adulteration of
Cream.**

SIR,—

I am directed by the Board of Agriculture and Fisheries to send you the following information as to the adulteration of cream which they think may be of use to the officers of your Local Authority engaged in the execution of the Sale of Food and Drugs Acts.

A sample of an article apparently intended to increase the weight or bulk of the cream was recently purchased for one of the Board's officers and submitted to the Principal Chemist of the Government Laboratory. The report of the Principal Chemist on this sample is as follows:—

"The examination of the sample gives the following results:—

Water	...	...	...	...	83'46	per cent.
Proteins	...	...	...	...	11'90	" "
Lactose	..	...	...	...	1'55	" "
Milk fat	..	...	...	...	1'26	" "
Mineral matter	...	...	...	...	1'28	" "
Boric acid	..	...	...	...	0'30	" "

"The substance would appear to consist of some form of albuminoid matter which has been worked into an emulsion with milk and water. When received, the substance was thick and pasty, but in the course of two days it became decomposed, and was then of the consistency of thin cream.

"Cream to which this substance has been added is undoubtedly adulterated, and although the material does not appear to give any distinctive reaction, its detection in cream is not difficult if regard is had to the ratio between the non-fatty solids and fat, and particularly to the proportion of proteins in the non-fatty solids."

Two other substances apparently intended to be used for concealing the inferior quality of poor cream have also been recently procured by

an officer of the Board and analysed by the Principal Chemist of the Government Laboratory.

One of these articles is described as follows in the report of the Principal Chemist :—

"The sample consists of a solution of lime in cane sugar syrup. This substance under various names has been in use for some years, and is said to have a remarkable effect in increasing the thickness of the cream. In ordinary analysis its presence would not be suspected as, if used in the quantities recommended * * * * * it would increase the ash of the cream only 0·04 per cent., and the total solids 0·19 per cent. There is, however, no reason why an analysis directed specifically to the detection of cane sugar, and to the estimation of the relative proportion of lime in the ash, should not reveal the presence of this substance. Its use, even in these small quantities, gives a fictitious value to cream."

The other article was of the same character, and is described as follows by the Principal Chemist in his report :—

"The sample consists of a solution of lime in cane sugar syrup, and is coloured with annatto colouring matter."

It is impossible to ascertain to what extent or in what localities the vendors of these adulterants may have succeeded in effecting sales to dairymen, and I am to suggest that samples of cream should be taken in the district of your Local Authority, and that the Analyst should direct his attention to the question whether the samples of cream submitted to him contain adulterants of the nature above described.

There is also reason to suppose that gelatin and cornflour are used as adulterants of cream.

The Board will be glad to forward to you additional copies of this circular for distribution amongst the members of your Local Authority and the officers concerned on being informed of the number you require.

I am, &c.,

T. H. ELLIOT,

Secretary

IMPORTATION AND OTHER REGULATIONS.

Importation of Cattle into Rhodesia.—According to Government Notice No. 110 of 1908, the importation of cattle from the United Kingdom of Great Britain and Ireland may be permitted under certain conditions. Importation shall be through and direct from the coast ports of Cape Colony, and there shall be a consignment note or other satisfactory evidence that cattle so imported have come direct from Great Britain or Ireland.

All cattle imported shall on arrival at Bulawayo, Salisbury, or Umtali, be removed to a place of quarantine under the supervision of an Inspector of Cattle, there to be submitted to such examination and tests as the Chief Inspector may direct. If such examination or tests disclose existence of any destructive disease, the cattle shall be immediately destroyed, and the carcasses thereof be disposed of in such manner as a Government veterinary surgeon may authorise or require.

The Chief Inspector may permit of any examination or tests as aforesaid being dispensed with in the case of cattle in transit by rail for any place beyond the boundaries of Southern Rhodesia.

All expenses or losses incident to quarantine, examination, testing, or destruction shall be borne by the owner of the cattle.

No person shall import cattle in terms of these Regulations except for his own use, provided, however, that permission may be granted to import for others on the applicant disclosing the name of the person or persons for whom he proposes to act.

A fine of £20 for each arrival is provided in case cattle are imported in contravention to the Regulations, and in default of payment imprisonment with or without hard labour for a period not exceeding six months. Further, such penalties shall not exempt any cattle from destruction under the Regulations.

Live Stock Import Regulations, Western Australia.—According to regulations under the Stock Diseases Act, 1895, dated June 25th, 1909, live stock imported into Western Australia from the United Kingdom may be landed at the ports of Fremantle and Albany, subject to inspection and quarantine. They must be shipped at London, Liverpool, Glasgow, Dublin, or Cork.

Any person intending to introduce foreign stock, including poultry, into Western Australia, must give not less than fourteen days' notice in writing to the Chief Inspector of Stock, Department of Agriculture, Perth, Western Australia.

The exporter must also make a declaration before a Justice of the Peace, stating how long the animals have been in his possession, that they have been during the preceding six months free from any infectious or contagious disease and have not been exposed to infection; that none of them will be conveyed to the port of shipment in a truck in which other stock have been carried unless such truck has been washed and disinfected; and that the cattle or horses proposed to be exported have not been tested with tuberculin or mallein respectively during the preceding two months.

This declaration must be sent in a registered envelope, at least four days before the date of shipment, to the Western Australian Government Veterinary Inspector at the port of shipment, viz., London, Liverpool, or Glasgow. The exporter must also cause horses to be subjected by a properly qualified veterinary surgeon to a mallein test for glanders, and cattle to a tuberculin test for tuberculosis, and obtain a certificate of the freedom of the stock from disease. This certificate must also be posted at least four days before shipment to the Western Australian Government Veterinary Inspector at the port of shipment.

On arrival in Western Australia, horses, mules, and asses from the United Kingdom must remain in quarantine for 14 days; cattle for 40 days; sheep and goats for 30 days; swine for 14 days; and dogs for 90 days. Horses will again be subjected to the mallein test, and cattle to the tuberculin test before their release from quarantine.

The regulations published in this *Journal* in February, 1906, p. 686, are cancelled.

Importation of Animals and Plants into Australia.—The *Commonwealth Gazette* of July 10th last contains regulations under the

Quarantine Act of 1908 with respect to the importation of animals and plants into the Commonwealth. Animals and plants may be landed at the ports of Sydney, Melbourne, Brisbane, Port Adelaide, Fremantle, Hobart; plants only may be landed at Newcastle, Geelong, Cairns, Port Darwin. The importation of all animals is prohibited, except horses, asses, mules, cattle, sheep, goats, swine, and dogs, and wild animals for exhibition or scientific purposes. When imported from the United Kingdom these animals must be shipped from London, Liverpool, Glasgow, Dublin, or Cork. The importation of horns and hoofs is prohibited.

The following plants or parts thereof are absolutely excluded :— Stone fruit trees from any part of the world where either "Peach Yellows" or "Peach Rosette" exists; pear trees where Pear Blight exists; gooseberry plants from any country affected with American Gooseberry Mildew. Certain other plants may be introduced only under specified conditions. All animals and plants imported into Australia are subject to quarantine.

Importation of Plants into S. Australia.—The introduction of plants is governed by regulations, dated July 9th, 1908, the former regulations of October 9th, 1907, being revoked. Trees, plants, and fruit, except grape vines and grapes, may be imported through Port Adelaide. They must have been thoroughly cleaned of soil, but will be examined on landing by an inspector and dealt with as he may direct.

Plant Import Regulations, Western Australia.—According to Regulations made under an Order in Council dated June 5th, 1907, any plants and parts thereof imported into Western Australia must be introduced through the ports of Albany and Fremantle. They must be disinfected immediately upon arrival, and if found to be infested with any pest, they must be quarantined for 14 days. Plants that are not presented for disinfection will be seized, and, if infested with any pest, destroyed.

The importation into the colony of all peach, nectarine, apricot, plum, prune, and almond trees, and all trees budded or grafted upon peach stocks or roots, and all peach or other pits, cuttings, buds, or scions raised or grown in any place where the "peach yellow" or the "peach rosette" are known to exist, is prohibited.

The importation of any fruit, plant, or part thereof infested with the codlin moth, mussel scale, Queensland fruit fly, *Phoma citricarpa*, *Aspidiotus nerii*, phylloxera, San José scale, the mining or *Chionaspis* scale, the wax scale, or with internal parasites such as the larvæ of the codlin moth, fruit flies, nematodes or bacterial diseases, or with melanose fungus, is prohibited.

All consignments of fruit found to contain fruit infected by codlin moth will be destroyed.

There is a fixed scale of fees, payable in advance, for inspection and disinfection; and no compensation will be paid for goods destroyed under the regulations.

These regulations do not apply to any port or part of Western Australia north of the 26th parallel of South Latitude.

By an Order in Council of February 24th, 1909, it is provided that all potatoes imported into Western Australia from any country outside

the Commonwealth of Australia shall be handed over by the Customs or Postal Authorities to the Department of Agriculture to be grown in quarantine by the Department for a period not exceeding twelve months: provided that parcels of over three hundredweight may, with the consent of the Minister, be planted on the importer's own land when such land has been gazetted as a quarantine area.

An Order in Council dated March 17th, 1909, provides for the inspection and disinfection of vine cuttings and grapes.

Importation of Potatoes into Guernsey.—An Ordonnance of September 7th last prohibits the importation of potatoes into Guernsey from the United Kingdom.

Eradication of Weeds in the Transvaal.—The Noxious Weeds Act, 1909, dated June 30th, 1909, empowers the Governor to make regulations (1) imposing upon the occupier or owner of land in the colony the duty of clearing the land of certain noxious weeds and of keeping it clear; (2) empowering officers of the Department of Agriculture, police officers, &c., to enter upon land and direct the clearing of it from weeds, or in default of the owner or occupier to clear the land at his expense; (3) for preventing the introduction into the colony of any plant, seed, or grain, likely to propagate or spread noxious weeds.

Importation of Potatoes into the Transvaal.—With reference to the notice published on p. 413 of this *Journal* for August last relating to the importation of potatoes, the Board have received through the Foreign Office a Transvaal Government Notice (No. 945 of 1909) stating that after August 1st, 1909, all consignments of potatoes imported from the neighbouring colonies will be inspected upon arrival in the Transvaal, and if found to be free from insect pests and plant diseases, will be forwarded to their destination. Potatoes found to be infested with any disease may, at the option of the consignors or consignees, be re-consigned or despatched to Johannesburg for the purpose of being sorted. A charge of 6d. per case or bag will be made to cover the cost of re-sorting.

In the case of seed potatoes from over-sea, if the consignors or consignees do not wish to pay the charge for re-sorting, the potatoes will be destroyed within four days after arrival.

Any consignments found on arrival to be infected with black scab (*Chrysophlyctis endobiotica* Schil.) will not be re-sorted, but will be destroyed immediately on arrival.

Importation of Bee-hives, &c., into Cape Colony.—With reference to the notice which appeared in this *JOURNAL* for February, 1909, p. 875, and April, 1909, p. 53, the *Cape of Good Hope Government Gazette* for 13th August, 1909, contains a Proclamation (No. 352 of 1909), dated 9th August, prohibiting the introduction of bee-hives or used bee-hive accessories or appliances, or anything which has been used to contain or manipulate bees or bees-wax.—(*Board of Trade Journal*, September 23rd, 1909.)

Importation of Bees, &c., into the Transvaal.—The Board have been informed by the Colonial Office that the Importation of Bees Regulation Act, the provisions of the Bill for which were summarised in this *Journal*, July, 1909, p. 325, came into operation on June 29th last.

The Board have received, through the Foreign Office, a Dutch Royal Decree, dated the 28th July, prohibiting the importation into, and transit through, Holland of gooseberry bushes, red, white, and black currant bushes, and raspberry canes, and parts thereof, and also of articles serving, or having served, as packing for these plants.

Importation of Gooseberry, Currant, and Raspberry Bushes into the Netherlands Prohibited.

The Minister of Agriculture, Industry, and Commerce may grant exemption from the above prohibition, under certain conditions, in respect of new varieties of the bushes, or consignments imported for scientific purposes.

The Board of Agriculture and Fisheries have made an Order, dated September 23rd, 1909, postponing until April 1st next the date of the operation of the Tuberculosis Order of 1909.

Postponement of the Tuberculosis Order.

The attention of nurserymen and others is directed to Article 5 of the American Gooseberry Mildew and Black Currant Mite (Ireland) Order, 1908, which renders it unlawful to land in Ireland gooseberry and currant bushes brought from any place outside Ireland without a licence from the Department of Agriculture for Ireland.

Notice as to the Importation of Gooseberry Bushes, etc., into Ireland.

There is reason to believe that during the past season a few consignments of bushes were landed in Ireland in contravention of this Order, and as, in addition to the forfeiture and destruction of such bushes, all persons concerned in the landing of same are liable to severe penalties, the Department desire to announce that they will institute legal proceedings in any case of breach of the regulations of this Order which may come under their notice after this date.

MISCELLANEOUS NOTES.

The Royal Commission appointed by his Majesty to assist the Board of Trade in the organisation of exhibits illustrative of British Arts, Industry, and Agriculture at the forthcoming International Exhibitions at Brussels in 1910, and Rome and Turin in 1911, have appointed a special Committee to deal with agriculture, the members of which are:—

Advertisement of British Breeds of Live Stock at the Brussels Exhibition.

Mr. C. Adeane (Chairman),
 Sir Gilbert Greenall, Bart.,
 Sir Thomas H. Elliott, K.C.B.,
 Mr. Richardson Carr,
 Mr. Ernest Mathews,
 Mr. Edward Brown,
 Mr. U. F. Wintour,
 Mr. T. H. Middleton, and
 Mr. A. G. L. Rogers.

This Committee feels that in view of the important scale on which other nations are preparing to participate in these Exhibitions, and the efforts that are being made throughout this country, aided by the Government, to furnish a creditable and representative display of exhibits, it is essential that so important a British industry as that of the breeding of pedigree live stock should not be omitted.

It is obvious that it would be impossible to show live stock in an Exhibition that will remain open for a period of six months, and the Committee have therefore devised another means of bringing the excellence of British stock under the notice of those who will attend the Exhibitions from all parts of the world. They have been able to secure an excellent position in the Exhibition buildings at Brussels that can be used for the purpose of advertising the different breeds of this country. It is the wish of the Committee that the exhibit should be of a national character, and they have determined to ask the Breed Societies to co-operate with them in the organisation of a representative exhibit. The main points of the scheme drawn up by the Committee, full particulars of which are given below, are:—

- (1) To attract attention by large photographs of typical animals;
- (2) to give short descriptions in two or three languages of their chief merits; and
- (3) to inform would-be purchasers how to obtain animals.

The Committee propose that the exhibit shall be divided into sections, each section to deal with a particular breed.

At the top of each section in the exhibit will appear the name of the breed, under which will be placed enlarged photographs, 30 in. by 25 in., of the male and female types, and below the photographs a large placard 44 in. by 30 in., giving particulars in two or three languages of their chief uses. Underneath these frames there will be a counter on which to display publications and cupboards in which a supply of printed information relating to the breed may be kept for distribution.

Large photographs and descriptions should serve to attract the attention of visitors, but in order to turn the display to advantage it will be necessary to supply such information as will enable a foreign buyer to get into touch with British breeders. They have therefore suggested to the principal Breed Societies that each Society that decides to take part in the exhibit should compile a Register of breeders, giving their names and addresses, and, in addition, some particulars as to the size of the stud, herd, or flock.

The exact form of the Register is left to the Breed Societies, so that they may be made up to suit the particular case of each breed. The larger Societies may consider it desirable to go to some expense in the preparation of illustrated Registers.

In order that the advertisement thus secured may be confined to those breeders who are anxious to establish a foreign trade, the Committee consider that it would be desirable in every case for the Society to charge a fee for the insertion of a breeder's name in the Register. The number of registered animals should be stated so that foreign buyers wishing to see stock in this country may not be directed to a breeder who has very few animals to show.

Each section of the exhibit will have a counter space of about four

feet by two feet six inches. Some Societies may wish to retain the whole of this space for the display of their Register and other publications, whereas others may, if they wish, make arrangements with individual breeders for the display of their private cards or lists of stock. The Committee propose to engage the services of an attendant qualified to explain the exhibit and to give assistance to interested visitors. The attendant will also be authorised to distribute the advertisements of individual breeders who have made the necessary arrangements with the Breed Societies.

In order to cover the cost of the hire of space, the preparation of the exhibit, the payment of attendant, &c., the Committee propose to charge an inclusive fee of £30 for each section, this sum to be paid on allotment. It will be competent for Breed Societies if they think fit to recoup themselves for their expense by making a charge to individual breeders for the display of their cards and catalogues. The Societies will also be asked to supply good photographs for enlargement of a male and female animal typical of their breed, a short description of the chief merits of the breed, and copies of the suggested Register of Breeders for exhibition and distribution.

All the other expenses, the enlargement of photographs, the translation and printing of descriptions, the framing of exhibits, carriage, staging, hire of space, and payment of attendant will be defrayed by the Committee.

Applications for sections must be sent in to the Secretary of the Committee, 8 Whitehall Place, London, S.W., as soon as possible, and in any case not later than December 20th. In order that the Committee may arrange for the translation and printing of particulars about the breeds, each Society is requested to supply before January 15th :—

- (1) A brief description of the points of the breed.
- (2) A list of the special qualities and uses of the breed.
- (3) A list of the chief markets or auction sales at which bulls, rams, &c., are sold.

Registers of breeders and breeders' notices, for distribution, should be sent in to the Secretary of the Committee not later than February 15th next.

Forestry Congress at Brussels.—The Board are informed by the Foreign Office that a communication has been received from the Belgian Ministry of Agriculture stating that a congress of the *Association Internationale des Stations de Recherches Forestières* will be held at Brussels in September, 1910. The aims of this association are the development of forestry research, the exchange of views between the experimental stations, the adoption of uniform rules for experiments to allow of a comparison of results, and the collective examination of questions of general interest.

Exhibition of Machinery at Ekaterinoslav.—The Board are informed through the Foreign Office that the Zemstvo of Ekaterinoslav is organising an Exhibition of Agriculture and Commerce for South Russia, to be held from June to September, 1910.

The agricultural section comprises crops, farm animals and their products, buildings, machinery and implements, agriculture, silk production, farm management and agricultural science, manufacture of agricultural products. Exhibits may be sent from foreign countries, but these are not eligible for prizes. Applications for information should be made to the Managing Committee of the Territorial Exhibition, Ekaterinoslav. A copy of the rules can be seen on application at the office of the Board.

Congress of Horticulture at Brussels.—An International Congress of Horticulture will be held at Brussels in connection with the Exhibition of 1910, and will include seven sections, in each of which a variety of subjects will be proposed for discussion. The Congress will occupy four days, from April 30th to May 3rd, and a Flower Show will be held in the Exhibition at the same time. The subscription to the Congress will be five francs. Communications should be addressed to the Secrétariat Général, 28 rue Sainte-Catherine, Brussels.

Agencies for Sheep-Dips.—The *Board of Trade Journal* (October 14th, 1909) states that two firms of merchants in Montevideo are desirous of obtaining the agencies of British manufacturers of sheep-dips. Communications should be addressed to the British Consulate-General, Montevideo.

Notes on Agriculture Abroad.

Probable Demand for Pedigree Cattle in Venezuela.—H.M. Minister at Caracas reports that the Venezuelan Government has granted a concession for the establishment of a chilled meat industry in Venezuela for exportation, and states that with a view to the improvement of the breed of cattle in that country special beasts will be brought from England to cross with the native animals.—(*Board of Trade Journal*, September 2nd, 1909.)

Importation of Live Stock into Brazil.—In his Report on the Trade of Brazil (*F.O. Reports, Annual Series*, No. 4,358), Mr. Cheetham, Secretary of the Legation, observes that it is a matter of periodic discussion what breeds of cattle do best in Brazil. At present the breeders of the Plate are in favour, principally with their Devons, which is due not only to their freights being lower than the freights from Europe, owing to the smaller distance, but to the fact that they have availed themselves of the National Exhibition and other shows in different localities. They assert, moreover, and have succeeded in persuading the Brazilians, that their animals alone are capable of resisting red-water, which is the principal ailment against which Brazilian cattle have to contend. There is no lack of stock for the rougher purposes, though they are unevenly scattered, exportation going on in some parts of Brazil and importation in others, but the animals are in need of considerable improvement, as they are lacking in the qualities usually demanded for dairy and show. This fact is recognised by Brazilian experts, who are energetically devoting themselves to the subject, and have already been the means of introducing many Swiss, Dutch, and British animals for the improvement of the native ill-defined breeds.

The importation of horses is small. Hitherto there has been an

absence of the heavier draught stallions among those introduced, though Shires and Clydesdales have both been tried. The native horses are undersized but hardy. Hackneys, it appears, have given good results. It would be worth the while of breeders in the United Kingdom to send a commission to study the needs of Brazil with the object of establishing a regular trade. Breeders can easily be put into communication with the proper people, but it is necessary, in addition to this, for them to examine the conditions of the country and offer supplies accordingly.

Sheep are to some extent successful, chiefly in the State of Rio Grande do Sul. Difficulties are, however, encountered in many parts from their liability to suffer from the rains and the numerous tropical insects which abound, and also from the spoiling of their wool by clinging weeds in the pastures. The breeders of the Plate supply Southdowns and Romney Marsh.

Pigs do well, and a few are imported of the best British breeds.

Poultry are generally a degenerate mixture, but experiments are being made to cross them with better birds, such as Wyandottes, Orpingtons, and Plymouth Rocks, which have so far proved successful.

In this connection it may be mentioned that it was stated in the *Journal do Commercio* (October 10th, 1909) that Dr. H. Racquet, Director of the Zootechnical Bureau, was about to visit Europe in order to purchase breeding stock.

Number of Cattle in Paraguay.—Cattle breeding is one of the most important and best paying industries in Paraguay. No official data as to the number of cattle in the country are available; but Mr. Consul Griffith gives the following information from a letter published in a semi-official paper at Asunción, "El Diario," by Mr. Narciso M. Acuña, who has for many years made a special study of the cattle industry. The census of 1899 showed 2,625,496 head of cattle in Paraguay, and the number had increased to 3,104,453 head by December 31st, 1902. Calculating the increase at 20 per cent. per year, and allowing for decrease by death, losses, and other causes, Mr. Acuña places the number of cattle in Paraguay on December 31st, 1908, at 5,500,000 head. — (*F.O. Reports, Annual Series, No. 4,362.*)

Reafforestation in France. Mr. Consul Vicars, in his Report on the Trade of Lyons for 1908 (*F.O. Reports, Annual Series, No. 4,356*), states that much valuable work in reafforestation is being done by private enterprise, owing in great measure to the influence of the wealthy and powerful *Touring Club de France*, which has promoted the foundation of Juvenile Foresters' Societies (*Sociétés Scolaires Forestières*) among the schools, every member of which binds himself to plant a tree a year in the commune. By this means 222,515 trees were planted in the Department of the Jura and 110,800 trees in the Doubs in 1907. The importance of this movement can scarcely be over-estimated, for in the reafforestation of waste lands lies a sure source of wealth. The value of forest lands may be illustrated by the case of the small commune of Martignat, in the Jura Mountains, whose forests, at one time almost unproductive, now yield, as the result of assiduous replanting, such a handsome revenue as not only to pay all local rates and taxes, but last year to provide a bonus of 25 fr. a head for every inhabitant.

The weather during the *last* week of September was very unsettled, the sky being generally overcast and rain falling every day in some part of the kingdom. Falls of more than one

Notes on the Weather and the Crops in October. inch in twenty-four hours were recorded in many places, while in Ilfracombe 2'14 inches fell. Bright sunshine was considerably below the normal, being "very scanty" everywhere except Scotland E., where it was only "scanty."

During the *first* week of October the weather was variable, with frequent rain, interspersed, however, with fairly long intervals of bright sunshine. Rainfall was in excess of the average, and in the extreme south-east the excess was considerable. Warmth was "unusual."

During the *second* week the weather was again very unsettled. Rain fell almost daily, often in large quantities, and intervals of sunshine were mostly short. Falls of an inch or more in twenty-four hours were very numerous, and occurred over a large area. Bright sunshine was slightly less than the average, but the temperature was high, being "unusual" (England E. "very unusual") everywhere except England N.E. and Scotland E.

The same kind of weather prevailed in the *third* week, very mild, with frequent falls of rain, many being of more than an inch. Warmth was "very unusual" nearly everywhere, and sunshine only "moderate."

The weather during the *fourth* week was even more unsettled. Warmth was "very deficient" everywhere (England E. "deficient"), while rainfall was "very heavy" in the south. In several places over an inch of rain fell in twenty-four hours, while at Brighton no less than 3'32 in. fell. In one place 5'79 in. fell in three days.

The reports received from the correspondents of the Board show an unfortunate state of affairs everywhere. In Berkshire "the month has been most unharvestlike, and the little corn that appears is of a very variable quality, much being blighted, and, of course, entirely out of condition." "The greater part of the corn is now carted from the fields in a much damaged state, and much taken to the yards for cattle. All description of work on the farm has been much hindered, and wheat planting is done under difficulties. Roots are good, but mangolds should now be stored, and how they will be carted off the land is a difficult problem." "Grass is abundant, and the fruit harvest has been a most miserable one." In Kent it is said, "maize, grass, mangold, and turnips have grown fairly fast. The frequent rain interfered with and delayed potato digging." The heavy rain of the last week was followed by a frost, which seared many plants. In the fruit plantations little has been done owing to the wetness of the soil.

A note from Forres, N.B., shows that turnips in general are reported to be a good crop, though there seems to be more than the usual damage by "finger-and-toe." In some cases the attack is bad. The harvest has been tedious but by no means late, and generally the crop has been good and well saved. In very late districts the weather of the last fortnight has been disastrous, but while there is a change for the better just now (first week of November), a good deal of grain will not have ripened and will be destroyed by frost. On November 2nd some oats were still uncut and lying under six inches of snow.

The following preliminary statement has been issued showing the estimated total production of hops in the years 1909 and 1908, with the acreage and estimated average yield per statute acre in each county of England in which hops were grown :—

Counties, &c.		Estimated Total Produce.		Acreage Returned on 4th of June.		Estmd. Average Yield per Acre.*	
		1909.	1908.	1909.	1908.	1909.	1908.
KENT	East	Cwts 34,861	Cwts. 84,469	Acres 5,711	Acres. 7,364	Cwts. 6'10	Cwts. 11'47
	Mid	58,283	118,003	6,724	7,900	8'67	14'94
	Weald	62,600	108,843	7,201	8,711	8'69	12'49
	Total, Kent	155,744	311,315	19,636	23,975	7'93	12'98
	HANTS	9,444	21,176	1,414	1,636	6'08	12'94
HARLORD		14,966	54,554	4,997	5,572	2'99	9'79
SURREY		2,344	8,021	0 544	648	4'31	12'38
SUSSEX		15,785	40,203	2,775	3,579	5'69	11 23
WORCESTER		16,123	34,256	3,054	3,353	5'28	10'22
OTHER COUNTIES†		78	1,236	119	158	0'66	7'82
Total		214,484	470,761	32,539	38,921	6'59	12'10

* The average yield per acre is calculated on the acreage returned on 4th June, but as a certain proportion of that acreage was not picked, the yield per acre on the acreage actually picked would be rather higher

† Gloucester and Salop

France. The *Journal Officiel* of October 27th contains estimates of the barley and oat harvests of 1909. The area sown with barley was 1,821,000 acres, compared with 1,802,000 acres last year, and the crop amounted to 46,305,000 bushels, as against 39,416,000 bushels in 1908, and an average during the last five years of 38,654,000 bushels. The area of oats is stated to be 9,648,000 acres, compared with 9,625,000 acres in 1908, with a total yield of 329,243,000 bushels, as against 277,003,000 bushels in 1908, and a five years' average of 266,319,000 bushels.

Notes on Crop Prospects Abroad.

Germany.—The report of the *Landwirtschaftsrat* for October 1st estimates the results of the harvest expressed in percentages of an average crop as follows. Winter wheat, 92.6; spring wheat, 98.9; barley, 102.4; oats, 106.1; potatoes, 95.5. The figures for the same date last year were respectively 94.9; 89.9; 89.4; 87.8; and 94.4.

The report of the *Landwirtschaftsrat* for November 1st estimates the potato crop at 94.8 per cent. of an average yield, 5.1 per cent. of the crop being diseased. The figures for the same date last year were 95.9, with 4.3 per cent. diseased.

The Imperial Statistical Bureau, in its report on the condition of the crops in the middle of October, stated that the potato harvest was somewhat prolonged in consequence of the frequent rain, and in many districts was not yet finished. The yield was not in general equal to expectations, as the tubers were small, and suffered in many places

from diseases and insect attacks. On the whole, however, a satisfactory yield is anticipated, the average for the country being put at 2. (2=good, 3=medium or average).

Hungary.—According to the report of the Ministry of Agriculture on the crops in the middle of October the greater part of the maize crop had already been secured, and the part still standing had been benefited by the favourable weather. The yield is usually good or moderate. The cultivated area this year was 6,106,000 acres, and the yield is estimated at 83,083,000 cwt., against 73,027,000 cwt. last year. The potato crop has for the most part realised the favourable expectations, and on an area of 1,448,000 acres amounts to 4,610,000 tons, against 3,734,000 tons in 1908.

Roumania.—H.M. Consul at Bucharest (Mr. O. Wardrop) reports that the Roumanian Ministry of Domains has published preliminary statistics of the wheat and maize crops in 1909. The total wheat harvest of Roumania amounted to about 55,000,000 bushels, as compared with 53,120,000 bushels in 1908. The average for the last five years was 71,321,000 bushels, but this was due to the extraordinarily good crops of 1905 and 1906. Thus this year's crop has been about a normal one, and the quality is said to be exceptionally good, weighing 64 lb. per bushel. The maize harvest yielded about 12½ bushels per acre, and the total crop was about 67,000,000 bushels, which is just about the average of the last five years, and only 11,000,000 bushels less than last year. (*Board of Trade Journal*, October 21st, 1909.)

Servia.—The "Nachrichten für Handel und Industrie" (Berlin) of October 6th, quoting from a report by the German Consulate at Belgrade, states that it is estimated that in Servia about 939,000 acres were this season sown with wheat, and 1,408,000 acres with maize. The average yield is stated to be 16 to 18 bushels per acre of wheat and rye, and 23 to 27 bushels of oats. (*Board of Trade Journal*, October 21st, 1909.)

Canada.—The *Census and Statistics Monthly* for October estimates the average quality of the field crops at the end of September as follows:—Spring wheat, 82'58; oats, 83'97; barley, 81'22; rye, 81'29; and potatoes, 90'37. The quality is uniformly higher than at the same date last year.

Russia.—The Ministry of Agriculture has issued an estimate of the yield of the principal crops in the sixty Governments of European Russia as follows:—Wheat, 70,200,000 qrs.; rye, 101,000,000 qrs.; barley, 46,000,000 qrs.; and oats, 108,100,000 qrs. These figures may be compared with those published by the Central Statistical Committee in September as representing the probable yield in seventy-two Governments (*i.e.*, including the Caucasus and Siberia), *viz.*: wheat, 73,350,000 qrs.; rye, 85,600,000 qrs.; barley, 43,550,000 qrs.; and oats, 96,750,000 qrs. (*Dornbusch*, October 22nd, 1909.)

Holland.—The British Consul at Rotterdam (Mr. Henry Turing) reports that, according to the review of the harvest of 1909 issued by the Department of Agriculture, the crop of wheat was only moderate, and quality generally bad; rye was good in quantity but inferior in quality; barley was very good to fairly good, but the colour is reported to be bad; oats suffered from the unfavourable weather more than the other

cereals, so that the yield was only fairly good, and the quality inferior. As regards potatoes, the results were good in most provinces, with the exception of North Holland, where the crop was unsatisfactory, while in Limburg it was very good. The quality was better than was expected. The potato crop for factory purposes was satisfactory. Hay was a failure in low-lying country owing to excessive rain, but on the higher grounds the results were good; to a certain extent the second crop compensated for the first.

Hops in Germany.—The report of the Imperial Statistical Bureau, published in the *Reichsanzeiger* of October 13th, 1909, gives the estimated area and production of hops in Germany in 1909 as compared with earlier years:—

				Acres.	Yield (cwt.).
1909	...	...	...	71,541	119,221
1908	...	...	...	88,587	518,326
1907	...	...	...	94,594	475,358
1906	...	...	...	95,987	414,023
1905	...	...	...	97,592	575,770

The estimated yield in the past year was very low, and only amounted on the average to 1·7 cwt. per acre, as compared with 5·8 cwt. in 1908.

Warsaw Hop Fair.—H.M. Consul at Warsaw (Mr. C. Clive Bayley) reports that at the annual hop fair at Warsaw in October 535,000 lb. of hops was offered for sale, as compared with 441,000 lb. in 1908. The sales were 334,000 lb., compared with 262,000 lb. in the previous year. Owing to a long spell of fine weather and an early harvest, which permitted of careful picking and sorting, general quality was much higher than usual, and a larger quantity reached the market. There is every likelihood that the quantity remaining unsold at this year's fair will be quickly disposed of, while in the case of last year's crop some 45,000 lb. was still on hand at the commencement of this year's fair. Prices were from 2½ to 3 times as high as in 1908, as much as 2s. per lb. being obtained for the extra fine, and from 1s. 5d. to 1s. 8d. for first quality.

Argentina.—H.M. Minister at Buenos Ayres, in a memorandum written at the beginning of October, states that the drought which had afflicted the south and west of the province of Buenos Ayres for the previous eight months was brought to a conclusion by heavy rains early in September. In Cordoba and Santa Fé the wheat and linseed prospects were good, and even in the most afflicted parts of the country official estimates still hoped that the harvest would not be less productive than that of last year. The rain came too late to benefit the pastoral industry, which could only be described as being in a very bad condition. The mortality among sheep from drought is estimated at over a million, while the wool clip is likely to be one of the smallest recorded.

In another despatch, dated September 30th, Mr. Townley observes, "Reports are somewhat conflicting as to the possibilities of the future harvest, but on the whole I am of opinion that, owing to the drought and other causes, a crop considerably below the average may be anticipated, whilst the locust plague threatens to be more disastrous than usual."

United States.—The Crop Reporting Board of the Department of Agriculture states that the preliminary returns of the production of maize in 1909 indicate a total yield of about 2,767,316,000 bushels, or an average of 25·4 bushels per acre as compared with an average of 26·2 bushels in 1908. The total yield in the past three years has been as follows:—2,668,651,000 bushels in 1908, 2,592,320,000 bushels in 1907, and 2,838,423,000 bushels in 1906. The general average as to quality is 84·2 per cent., as compared with 86·9 in 1908, 82·8 in 1907, and 89·9 in 1906.

The preliminary estimate of the average yield per acre of potatoes is 106·5 bushels, against an average yield of 85·7 bushels in 1908. The indicated total yield is given as 367,473,000 bushels, against 278,985,000 bushels in 1908, 288,884,000 bushels in 1907, and 298,674,000 bushels in 1907.

The Board of Agriculture and Fisheries have been furnished by the Board of Trade with the following report, based on returns from correspondents in various districts, on the demand for agricultural labour in October.

**Agricultural Labour
in England
during October.**

Agricultural employment in October was much interrupted by continual wet weather, and there was a consequent loss of time for day labourers in most parts of the country. The corn harvest was prolonged in a number of districts and farm work was generally backward, but there was a good demand for extra labour when the weather permitted.

Northern Counties.—Day labourers were in irregular work through rain in most districts reported on by correspondents in *Northumberland*, *Cumberland*, and *Westmorland*. There was similar interruption to employment in *Lancashire*, where in certain districts the wet weather considerably hindered men employed on the potato crop. There was a fair amount of employment offered in *Yorkshire* on the corn harvest and potato and root crops, but rain interrupted these and other operations, and the supply of labour available was often in excess of the demand.

Midland Counties.—Rain delayed outdoor work in *Cheshire* and *Derbyshire*, and a number of day labourers were in irregular employment in consequence; the supply of these men was ample.

Threshing, and raising the potato and mangel crops provided a fair amount of extra work in *Nottinghamshire*, and, except on several wet days, the supply of and demand for day labourers were about equal. Some surplus in the supply was reported in *Leicestershire*. There was a good deal of interruption to outdoor work in *Staffordshire*; the supply of labour was generally sufficient, but in the Market Drayton, Tamworth, and Cannock Unions some difficulty was experienced in obtaining men for such work as potato lifting. Employment was fairly regular in *Shropshire*, though affected to some extent by the bad weather. There was, on the whole, a fairly good demand for extra labourers in *Worcestershire* and *Warwickshire*; in the Evesham Union the demand was said to be greater than the supply. Harvest work, threshing, &c., afforded a good deal of employment in *Northamptonshire*,

and extra labourers are not reputed to have lost much time, in spite of the wet weather which prevailed. Correspondents in *Oxfordshire* and *Buckinghamshire* reported some considerable loss of time among day labourers on account of wet weather. In both these counties and in Northamptonshire there was some demand for men qualified as waggoners, cattlemen, milkers, and shepherds. The supply of day labourers was generally in excess of the demand in *Hertfordshire* and *Bedfordshire*, though threshing and other work provided plenty of work for these men when the weather permitted.

Eastern Counties.—Employment was generally regular in *Huntingdonshire* and *Cambridgeshire*, with an equal supply of and demand for extra labourers, who were required for getting up potatoes and mangels. Work on the corn harvest, threshing, and potato lifting caused a good and fairly constant demand for labour in *Lincolnshire*; in the Brigg and Lincoln Unions it was stated that the demand was greater than the supply. Excessive rain caused farm work to be backward in *Norfolk* and *Suffolk*, but, according to most reports, the weather did not to a great extent affect the regularity of employment of extra labourers, who were wanted for threshing, carting and spreading manure, ploughing, hedge trimming, storing mangels, &c.; there was generally a sufficient supply of such men. Rain hindered outdoor work considerably in *Essex*, where harvesting operations were still proceeding at the end of October in certain districts.

Southern and South-Western Counties.—Threshing, raising potatoes and mangels, and hedge trimming provided fairly regular employment in *Kent*, but rain caused some loss of time to day labourers in most districts. Rain similarly interrupted employment in *Surrey*, where some surplus in the supply of labour was reported. Much loss of time by day labourers was reported in *Sussex* and *Hampshire*, where rain considerably hindered farm work. In *Berkshire* employment, on the whole, was fairly regular, but in *Wiltshire* a good deal of irregularity of employment was reported, with some surplus of extra labourers. Threshing, raising roots, and hedge trimming, when the weather permitted, offered a fair amount of work for day labourers in *Dorset* and *Somerset*, though in several districts there was much loss of time from wet weather; the supply of extra men was well up to the demand. The employment of day labourers was generally very irregular in *Herefordshire*, and the supply was in excess of the demand. Employment was interrupted to some extent by rain in *Gloucestershire*, but manure carting and mangel pulling provided a fair amount of work for day labourers. A good supply of permanent labourers was reported by several correspondents, but there was still some scarcity mentioned in reports from the Dursley and Stow-in-the-Wold Unions. Several days were lost by day labourers in most districts in *Devonshire* on account of heavy rains, and the demand for this class of labour was only moderate. There was also some irregularity of employment in *Cornwall*, where, however, the supply of and demand for day labourers were, on the whole, fairly good and about equal.

THE CORN MARKETS IN OCTOBER.

C. KAINS-JACKSON.

Threshings of the home crop of wheat have rapidly increased during October, while importation has also been liberal. No special trade in oats has been done, but maize has recovered favour, and in the last few days of the month sales were quite active. The semi-official estimates of Russian crops, published on the 22nd, were extremely optimistic, and exerted some depressing influence on the prices of wheat, barley, and oats. But before the month closed confidence seemed in the way of re-establishing itself, owing to the belief that the vigorous Continental inquiry in September and October had already cleared off substantial portions of the Russian surpluses. The brisk sales of Russian grain to German, Austrian, Italian, and other buyers have relieved the current situation, but such sales are likely to throw American surpluses to a greater extent upon the British market, the Continent buying freely of the New World when Russia has only a small surplus of cereals, but giving Russia the preference when its grain is promptly forthcoming.

Wheat.—British produce during October had a remarkably wide range; 28s. to 29s. was accepted for weather-injured samples, fit only for poultry use, and some of the markets recorded averages not indicative of any material deliveries of milling corn. Among these we may note for the week ending 23rd, Berwick 28s. 11d., Doncaster 29s. 7d., and Nottingham 29s. 2d. per qr. In Lincolnshire and the Fenslands 30s. to 31s. ruled. While these prices were the recorded values for new and damp grain, London was witnessing bids of 44s. for fine 1908 seed wheat, and 40s. for the best new of ordinary growth for the mill. Wheat grown for seed was fetching in later October 44s. to 50s. for Squarehead Master, 40s. to 44s. for New Red Standard, 38s. 6d. to 40s. for Browick, 36s. to 38s. for Gray Browick, 42s. to 44s. for White Wilhelmina, 46s. to 48s. for Red Canadian (English-grown), 45s. to 47s. for French Treasure, and for the Red Marvel. These were prices asked by farmers; the special care and selective ability of the leading seedsmen demanded a higher price, which varied from 56s. to 84s. per quarter, the higher sum commanding, of course, the latest and most fancied varieties.

At the Dorchester show on the 16th, some excellent new wheat was exhibited which was secured in the south in that fine August fortnight preceding the 17th of that month, a date from which good harvesting weather was not again at all continuous till September 13th–27th, or thereabouts. It appears from the October markets that the great preponderance of presentable samples came from wheat secured either from August 3rd to 16th, or from September 13th to 17th. Thus early ripening and late ripening districts fared better than the middle region, and this may account for the very unsatisfactory threshings and resultant low averages in such counties as Notts, Lincoln, and Norfolk. In the eight weeks of the present cereal year 33s. 2d. was averaged, as compared with 31s. 3d. last season; but in October, 1908, fairly dry and fit wheat could be bought for 33s. to 34s., whereas during the past month 36s. to 39s. has been commanded by such samples. The total sales of

British wheat this season are much below those of the like period last year.

Imported wheat has been in varying request, and different sorts have had their "day" at most markets. Old Manitoba was quickly absorbed, and there was a pause in that branch of business till towards the close of the month, when the new crop began to arrive. It varies a little with the port of offering, but may be quoted at 41s., 40s., 39s., and 38s. for the four milling grades. As the fourth compares with fair average quality English it will be seen that the Dominion is not depressing 33s. 2d. English. The American new crop of winter wheat is arriving at last in fair quantity, but 37s. to 38s. per qr. is as a rule obtainable, and the weak spots of October trade have rather to be sought in Russian and Indian arrivals. The former closed with a better feeling, despite the crop news, cargoes for November shipment being held at 41s. 6d. for finest 492 lb. Winter, 39s. 6d. for Odessa Ghirka, 38s. 6d. for Sea of Azoff hard red. This gives a mean of 39s. 10d. Indian wheat harvested in a beautiful climate and shipped promptly escapes weevil, which in later exports is apt to assert itself. This season, however, the pest is less in evidence than usual. The seven sorts offered at Mark Lane on October 29th made 41s. 6d. for White Bombay, 41s. 3d. for White Delhi, 41s. 3d. for No. 2 White Calcutta, 40s. 6d. for Soft Red Calcutta, 40s. 6d. for Central Indian mixed, 40s. 3d. for White Jubbulpore, and a like price for ordinary Red Kurrachee. A fair sale of Australian at 43s. to 44s. was reported; but New Zealand at 38s. to 39s., Durum at 36s. 6d. to 38s., and Turkish at 37s. to 37s. 6d. were in less favour.

The shipments of October included the enormous quantity of four million quarters of Russian wheat, or virtually double the September exportation. Nevertheless, on the 31st there were only 400,000 qrs. on passage to the United Kingdom, the Continent having undertaken to receive, or actually received, the remainder. North America shipped 1,400,000 qrs. of wheat and 727,000 sacks of flour, these figures including the first new crop shipments of Canada. The total is not large for the central period of autumnal exports. South America shipped 50,000 qrs. of wheat, Roumania 357,000 qrs., India 135,000 qrs., and Australasia 83,000 qrs. On the first day of the month 1,600,000 qrs. were on passage, and on the last day 1,355,000 qrs., so that the situation for spot holders was gradually improving as the month proceeded.

Flour.—The October trade in London with American, Hungarian and Belgian types has been done at practically the same prices as prevailed at the close of September. A certain depression in tone has, however, been manifested, owing to the large offers of country flour made in too many cases from wheat none too fit for the purpose. There have been patents which fetched over 30s., all-English straight-run which realised 29s., and roller whites which had buyers at 28s. But there have been sales at 3s. under these prices; so much has depended on selection of sample even within one type. Some excellent flour from the Canadian mills was offered at 33s. to 34s. per sack. Owing to the liberal shipments from America the quantity on passage rose during the month from 180,000 to 284,000 sacks.

Barley.—The excellent malting samples grown in Wilts, and above all in Dorset, which were shown at Dorchester on the 16th, gave an impression of the year's yield which the Brewery Exhibition in London appeared to endorse, though the Championship in London went to Somerset and not to Dorset. Unfortunately there exists no doubt that the proportion of good malting samples this season is less than usual. The London Championship was won by barley secured on August 9th, the Dorchester Championship by barley secured on August 12th. But the vast bulk of the barley of England in 1909 was not ripe before the fine weather broke up. Suffolk is the great grower of Champion barley. But the Suffolk barley at this year's London show was secured at Rushmere as late as September 20th. Other Suffolk dates varied from September 1st to 9th. These were Chevallier sorts. The Goldthorpe Championship also went to Somerset, but the rules of the competition make dates optional, and the date when this barley was secured is not given, but other prize Goldthorpe samples were secured on dates varying from July 20th to August 7th. The Haygrove barley sown on January 30th and reaped on July 20th will count as one of the year's features in the barley world, and we may look to see a demand in the future for types which ripen early.

The barley average shows little change from this time last year, but English malting ranges from 31s. to 39s., as compared with 34s. to 41s. then. Moravian malting has fetched from 43s. to 44s. and is scarce. Russian feeding barley has been offered at 20s. per 400 lb., and at the close of October the price began to attract custom, and 20s. 6d. was quoted at the markets. The Russian shipments of October exceeded three million qrs., but the increase in the supply on passage to this country during September was not continued during October, the total on the 31st being 560,000 qrs. A very heavy sale to the Continent took place all through the month. Malt has been a fairly good business, English making 38s. to 43s., Scotch 39s. to 44s., Brown 34s. to 36s., Black 33s. 6d. to 35s. 6d., Californian 39s. to 40s., and Anatolian 40s. to 42s.; all malt, foreign and British alike, is sold per quarter of 336 lb.

Oats. For the first eight weeks of the new cereal year oats averaged 17s. 8d. per qr., against about sixpence less in 1908-9. The Dorchester show produced some splendid White oats sown in March and reaped in August, and Mark Lane was never, throughout October, destitute of a few fine new lots worth a guinea to 22s. per 336 lb. There were some samples shown at Dorchester which weighed 352 lb. It is, however, to be recorded on the other side that miserable quality has marked the bulk of offerings at Lincoln, Norwich, Peterborough, and a number of other important markets. Averages such as 16s. 10d. (Lincoln, 23rd), 16s. 8d. (Norwich, 23rd), and 16s. 3d. (Peterborough, 23rd) show value almost down to Russian and La Plata level, for the buyer gets 312 lb. of English oats against 304 lb. only of imported. The demand for oats was weak all through October. Russia shipped 1,100,000 qrs., but no other exporter did anything material.

Maize.—About 800,000 qrs. were shipped from New World ports and about 200,000 qrs. from the three older Continents, so that October's export trade was almost exactly a million qrs. This is less than an

average, and the supply on passage fell from 910,000 qrs. on the 1st to 730,000 qrs. on the 31st. The markets were very steady at 25s. to 26s. per 480 lb. for probably 95 per cent. of the total offerings. Some fine Cinquantina at 33s. and good South African at 28s. showed that quality could command its price.

Pulse.—Tares for autumn sowing have now fallen to about 8s. per bushel, but the trade is practically over for the season. New spring tares are on sale at 6s. per bushel up to 7s. 6d. for special lots. The trade in new English beans is small owing to their soft state; 36s. per 504 lb. is paid for anything fairly hard and dry. Peas have had their customary wide range, from 30s. per 504 lb. for Indian Green up to 96s. per 532 lb. for best English hand-picked Marrowfat. The largest sales of peas in October were of English Dun at 34s., and of Maple at 46s. The imported sorts most dealt in appeared to be Chinese at 33s. per qr.

Oilseeds.—A rapid advance took place in the price of linseed from the 1st to the 22nd, and there was not much reaction in the last eight days. Rapeseed and cottonseed shared in the upward movement, but the latter, with large shipments of Egyptian new crop in the last week of the month, was regarded as likely to be cheaper by fully 5s. per ton before November was out. Prices ruling at the end of October were 55s. to 60s. per 416 lb. for good linseed, and 162s. to 166s. per ton for Egyptian cottonseed.

Farm Seeds.—There has been a good demand for Trifolium and the Trefoils, while fine Cloverseed has been at a premium. The English new crop is lacking, as a rule, in quality, and was secured in very poor condition. Despite the wet season Lucerne sells at a good price. Prices at the close of October included 80s. for the best Red Cloverseed, 40s. for common sorts, 72s. for best White, 88s. for fine Alsike, 78s. for Lucerne, 70s. for Cocksfoot and for Suckling Clover, and 68s. for fine Trefoil, all per cwt.

Minor Staples.—Canary seed has sold steadily at Mark Lane, but there has been a good supply of Argentine, and 46s. was accepted on the 29th. Carraways have declined to 30s. per cwt. Poultry food is in improved request with the advance of the season, but liberal offerings have caused the price rather to favour buyers. At the end of October an excellent mixture could be procured from good firms for 7s. per cwt. Barley meal also commanded 7s. per cwt., but buyers of not less than 3 cwt. could obtain that quantity for cash at 20s. 6d. Lentils have come down to 38s. per 504 lb., but are still above the ideas of ordinary buyers.

THE LIVE AND DEAD MEAT TRADE IN OCTOBER

A. T. MATTHEWS.

The frequent rains and generally high temperature have kept the pastures full of grass, but the feeding quality has been poor, and cattle have not done very well in spite of the abundance of food. From nearly every market the reports have spoken of the extreme scarcity of well-finished cattle, particularly at the close of the month, and the

fact that prices have been so well maintained points to a healthy condition of the demand for English beef. The average price of first quality Shorthorns has certainly fallen about $5\frac{1}{2}d.$ per stone during the last few weeks, but it is extremely doubtful if it would have done so if the high condition of the animals could have been maintained. The prices that have all along been given for the few really ripe cattle seem to point to a defect in the system of feeding pursued by graziers, who rely too much on a purely grass diet, unassisted by concentrated food. Vast numbers of half-meated cattle have been sold to kill this October, which ought to have gone to the stalls for two months' good feeding. There has, in this way, been a great waste of good material for the production of prime beef.

Shorthorns described as first quality have been very steady in value, and 8s. per stone has been their average all the month. Even second quality only varied to the extent of about $\frac{3}{4}d.$ per 14 lb., the average ranging from 7s. $2\frac{1}{4}d.$ to 7s. $3d.$

No other breed is separately quoted in more than four or five markets, but during October, Herefords, Devons, Runts, and Scots varied considerably more in their averages than the Shorthorns. For purposes of comparison, however, prices during the month having varied so little, it may be sufficient to give them for each breed as they stood during the last week. Shorthorns in 21 markets averaged exactly 8s. per stone for first and 7s. $2\frac{1}{2}d.$ for second quality; Herefords, 8s. $4\frac{1}{2}d.$ and 7s. $9d.$; Devons, 8s. $4d.$ and 7s. $4d.$; Runts, 7s. $10\frac{1}{2}d.$ and 7s. $3\frac{1}{4}d.$; and Polled Scots, 8s. $3d.$ and 8s. $0\frac{1}{2}d.$

As regards comparative prices at different markets there has been a very wide margin. Ipswich has maintained its curiously isolated position, and, in the first week, stall-fed Shorthorns were quoted up to 9s. $3d.$ per stone, against 7s. $7d.$ at Leeds, Liverpool, and Wakefield. Even second quality at Ipswich fetched 8s. $3d.$, which exceeded the average for first quality in 24 markets by $3d.$ per stone. In the last week the top price at Ipswich had fallen to 8s. $9d.$, while Liverpool was still the lowest at 7s. $7d.$

The live-weight prices of the month were very instructive, and go far to prove the strength of the contention that well-bred and well-finished cattle are by far the most profitable. In the last week at Dundee an exceedingly nice lot of cross-breds averaged 39s. per cwt., and pure-bred Polls a little over 40s., while on the same day the larger portion of cattle fetched only 34s. $6d.$ to 36s. At Edinburgh on the 26th prime lots made 42s. to 44s. $9d.$, and at Glasgow on the 27th good Polls reached 43s. $6d.$ During the third week a Hereford at Wellington (Shropshire) realised 42s. $6d.$, and these cases have been frequently repeated. At the Metropolitan Cattle Market very few cattle have been weighed, and scarcely any of the best. All the choicest animals have been taken off in the early morning by large buyers for contract purposes, and therefore the instances given in the weekly notes in the Market Returns of weighbridge results at Islington have read very low in comparison to other markets.

Veal Calves.—There is singularly little to record in connection with the calf trade. Prices have been moderate and very even throughout the country, reports having come from about 24 markets in England

and Scotland. The top price has scarcely exceeded $8\frac{1}{2}d.$ per lb. in England and $8\frac{1}{2}d.$ in Scotland, while the general averages have only varied about $\frac{1}{2}d.$ per lb. The highest were for the last two weeks, when they were $8d.$ for first and $7d.$ for second quality.

Fat Sheep.—With good crops of roots to feed off and little temptation to send to market, farmers have still been sending forward large supplies, which have been more than equal to the demand. Prices have been very little changed, however, except for fat ewes, which have met with more inquiry. There is no doubt that, on the whole, the tone of trade was much less depressed and sheep were more saleable, although only in a few cases here and there could any actual advance be established.

In the first week the average for prime Down wethers in all the markets officially recording them was $\frac{1}{2}d.$ per lb. higher than the lowest point touched, viz., $7d.$ per lb., which occurred in September, but second quality remained at $6\frac{1}{2}d.$ Neither were the Longwools affected by the slight improvement, their average being $6\frac{1}{2}d.$ for first and $5\frac{1}{2}d.$ for second quality. There was no change worth mentioning in the second or following weeks, Down wethers remaining at above values. Longwools also remained unchanged for first quality, but in the third week their average for second quality improved rather suddenly by no less than $\frac{3}{4}d.$ per lb. In the last week the average for Longwools was $6\frac{3}{4}d.$ and $6d.$ per lb. The advance in heavy Longwool wethers was probably due to the same cause as that which gave rise to quite a revival in the fat ewe trade, which class of mutton, of course, represents the third quality, quoted in the returns. For weeks fat ewes were reported from many quarters as unsaleable, and the common quotation of $4\frac{1}{2}d.$ per lb. was often admitted to be nominal. But about the middle of the month an advance in frozen mutton occurred, and this had an immediate effect on the ewe trade, though not nearly so great a one in the live-stock markets as in those for dead meat. It was highly significant that one of the largest firms in the frozen meat trade should send a representative to purchase ewes in the Somersetshire markets, but farmers, being apparently unaware of the movement, failed to make the most of the position, and quotations only advanced about $\frac{1}{2}d.$ per lb. for live ewes.

The month of October marks the beginning of a new season in the supply of English mutton, and the bulk of the sheep on offer have lately been of a rough character, especially for the London trade. Longwooled two-year-old wethers of 90 to 100 lb. in weight, and Irish Longwools have formed a large portion of the Islington supply, and for these there is scarcely any demand in London shops. At the first market in October, however, some very fine Hampshire tegs put in an appearance. Their weight would be about 56 lb., and they were just what appeals to the town butcher. Yet this first lot were sold with difficulty at $7\frac{1}{2}d.$ per lb., so lifeless was the demand on that day. In the following week they attracted more notice, and although they were only quoted at $7\frac{3}{4}d.$ per lb., disinterested observers calculated that when slaughtered they would be found to have cost $8d.$ or even more. Young tegs of this class will soon be replacing the coarser and older sheep, and the quotations for first quality, especially at Islington, ought to improve during November.

Fat Lambs.—Although fat lambs still continue to be quoted in several markets, the season is really over, and quotations have been very little higher than those for mutton. The average of the eleven markets quoting lambs separately for the last week in October was 7½d. per lb. for first and 6½d. for second quality.

Fat Pigs.—There was no diminution in the demand for fat pigs, and, supplies being very moderate, prices continued to harden. Bacon pigs gained in average value during the month to the extent of 1½d. per stone, for pigs of both light and heavier weights. The subject of breeding and marketing English pigs was much discussed during the month, including the proposed establishment of factories on the Continental system. London factors tell the writer that much depends on the breed of the pigs for the success of such enterprises, and that what is required in our markets are pigs with more lean meat and a lighter fore-quarter.

Carcase Beef.—Very large arrivals of chilled beef from Argentina and ranch-fed cattle from Canada had a quieting effect on the trade at the beginning of the month. The first mentioned was very cheap, selling at 4d. per lb. for best hind-quarters, a fall of 2½d. in six weeks. Port killed was also selling at 5½d., against 6d. a month earlier. Prime Scotch sides were worth 6½d. and English 5½d. per lb. The second week prices were firmer, except for frozen, but trade in the third week was affected by the damp and warm weather prevailing. Fresh killed beef was not much affected, but chilled declined from ½d. to ¼d. per lb., recovering at the close with cooler weather. On the whole the trade in carcass beef was steady throughout the month, with very little change in values. Best frozen hind-quarters have realised from 3½d. to 3¾d. per lb.

Carcass Veal.—The trade for both English and Dutch veal was very quiet in London, and prices for the very best quality did not exceed 6½d. per lb. In the first and third weeks the highest quotation was 6d. per lb. Inferior Dutch veal was procurable at 4½d. per lb.

Carcass Mutton.—The month opened with prime Scotch selling at 6d. per lb. and English at the same price. Dutch sheep were worth 5d. and small tegs 5½d. per lb. In the second week a great surprise was sprung on the retailers of frozen mutton, holders suddenly advancing the price by 1d. per lb. on Argentine, 1½d. on Australian, and ¾d. on New Zealand. No corresponding advance was asked for British and Dutch fresh killed, and the values of these were unusually close to that of frozen. Good young ewe mutton was only fetching 3½d. and Dutch 4½d. to 5d., against 4½d. for best New Zealand frozen. The position was even more remarkable the following week, a further rise taking place in frozen, and Scotch and English being cheaper than ever, except that ewes rushed up 1½d. per lb., many carcasses making 7s. 6d. each more than the previous week. Relative prices in the Central Market then stood as follows:—British first quality, 5½d.; New Zealand, 5d.; Dutch, 4½d.; Argentine and Australian, 4½d.; and English ewes, 4½d. per lb. In the last week frozen gave way ½d. per lb., while British advanced ½d. for prime quality, and ewes sold well.

Pork.—The demand for pork improved, and, with moderate supplies, prices were good. Prime small English realised 7½d. per lb. throughout, and even Dutch was worth the same money in the second week.

THE PROVISION TRADE IN OCTOBER.

HEDLEY STEVENS.

Bacon.—The conditions for trading have again been most trying to dealers generally, and the wet weather during the month has probably had a depressing effect on business.

The London market has kept very clear of Danish, Dutch, and Canadian sides during the whole of the month, as, in addition to the small arrivals, a good deal of the Danish supply was diverted to the northern ports, to fill orders usually taking Canadian or American. By the end of the month prices for Danish were lower, the London market being very unsettled, though this did not so much apply to other ports. On the other hand, American bacon and hams were held for more money at all points, and the demand for this description even at the enhanced figures was quite sufficient to prevent any accumulation of stock.

Cable advices from the United States report slightly freer arrivals of hogs at the packing centres, but they are young and immature, growers apparently being tempted to market them early, and so make sure of the present extreme prices obtainable for the raw material. Packers do not anticipate any set-back in prices before the beginning of 1910, as they will not accept orders for November and December shipments at less than current prices, and in some cases (notably for bellies) sales have been made at several shillings premium.

During January to September inclusive this year, the decrease in arrivals from the United States of America amounts to 26,423 tons, compared with the same period last year.

Canada is still sending very small consignments of bacon, and the packers' agents find no difficulty in clearing all arrivals at satisfactory prices in comparison with English, Irish, and Danish sides, but it is understood that these prices are still unremunerative to the Canadian packers, and the few continuing to run their houses are only able to do so on account of the satisfactory prices secured on that portion of the hog which they are able to sell for home consumption.

The trade in English and Irish bacon is fair, and prices show little variation on the month. Pigs continue to be marketed in very small quantities.

Cheese.—The month of October, 1909, is likely to prove a record one for the small demand for Canadian cheese. At all points the daily cry has been "no orders." Spot holders gradually reduced their prices, hoping to bring out buyers, but without result. In some districts grocers had contracted during the summer months a portion of their requirements for October delivery, and apparently this was quite sufficient to fill their demand.

In consequence of the dull trade, merchants bought very sparingly from Canada for shipment. To induce business, prices were gradually reduced to at one time as low as 53s. c.i.f. for October makes. Since then prices have hardened a little, and by the end of the month 54s. 6d. c.i.f. is being asked for the same description, and 56s. 6d. for Western makes. Canadian cables report that there will be a decrease in the October-November makes, as so many factories have

turned from cheese to butter making, also in some sections the United States has contracted for daily supplies of cream, at prices which prove more remunerative than the making of either cheese or butter.

Up to October 16th the receipts of cheese into Montreal show an increase of only about 17,000 cheese over 1908, and shipments about 21,000 in excess. At the end of the month the estimated stocks at the three principal distributing centres (London, Liverpool, and Bristol) were 377,530, against 372,769 last year, and 377,133 two years ago.

In New York, best cheese are making about 7ds. c.i.f.

Cables continue to advise a large make of cheese in New Zealand. Some reliable authorities suggest that there will be an increase over last season of at least 2,000 tons, but it is purely guess-work, as so much depends on the weather conditions. There are several additional new factories running this season. Output contracts for the season have been effected at about 57s. c.i.f.

The make of English cheese has continued good, especially in the West of England, and the prices of some dairies being near to those for Canadian, many grocers are confining their trade to the former.

Butter. The demand throughout the month has been steady, but at no time has any keenness been shown by buyers, although most descriptions show advances on the month. The demand has been almost entirely for the best fresh goods, and buyers await arrivals of the new Colonial, which will now steadily increase in quantity.

A largely increased make is anticipated both in Australia and New Zealand. Some further contracting has been done, at about 108s. c.i.f., but it is anticipated that the larger proportion will be shipped on consignment and sold at market price on arrival.

In Canada the demand has not been brisk, but prices have been above an export basis. With butter so high in price in the United States (150s., 155s.), there is a prospect of some of the stored Canadian being shipped across the border, although the duty is a heavy one. The receipts into Montreal since May 1st show a falling off from last year of 32,824 packages to the middle of October, and the reduced shipments for the same period 49,829 packages.

Trade in Irish butter has been good, and prices show advances on the month.

Eggs.—The demand has been good throughout the month, and, as is usual at this time of year, prices gradually hardened. With a scarcity of fresh English eggs, there has been a good demand for pickled.

Recent advices from Canada report :—"The receipts of eggs during the last few weeks have been exceeding light, as they are very scarce in the country. There is not sufficient coming in to supply the local demand, and the trade have been compelled to break into their storage stock. This has caused an advance in prices of fully one cent. per dozen, as dealers have to pay this advance in the country. Straight gathered stock is selling at 23 cents f.o.b. country points. Selects are now being offered at 26½ cents to 27 cents in round lots, and No. 1 stock at 23½ cents to 24 cents." No eggs have been exported so far this season to England through the port of Montreal.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and SCOTLAND
in the Month of October, 1909.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	ENGLAND.		SCOTLAND.	
	First Quality.	Second Quality.	First Quality.	Second Quality.
FAT STOCK:—	per stone.*	per stone.*	per cwt.†	per cwt.†
Cattle:—	s. d.	s. d.	s. d.	s. d.
Polled Scots	8 3	7 9	40 10	35 7
Herefords	8 4	7 6	—	—
Shorthorns	8 0	7 2	40 0	35 10
Devons	8 4	7 5	—	—
	per lb.*	per lb.*	per lb.*	per lb.*
	d.	d.	d.	d.
Veal Calves	7½	7	8½	6½
Sheep:—				
Downs	7½	6½	—	—
Longwools	6½	5½	—	—
Cheviots	7½	6½	7	6½
Blackfaced	6½	6	6½	5½
Cross-breds	7	6½	7½	6½
	per stone.*	per stone.*	per stone.*	per stone.*
	s. d.	s. d.	s. d.	s. d.
Pigs:—				
Bacon Pigs	7 4	6 11	7 2	6 4
Porkers	7 9	7 4	7 6	6 9
LEAN STOCK:—	per head.	per head.	per head.	per head.
Milking Cows:—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk ...	21 16	18 1	22 13	18 5
„ —Calvers	21 1	18 5	20 9	17 4
Other Breeds—In Milk ...	20 5	14 14	19 11	16 8
„ —Calvers	14 10	13 2	19 17	16 2
Calves for Rearing	2 3	1 13	2 7	1 11
Store Cattle:—				
Shorthorns—Yearlings ...	10 4	8 11	10 9	8 8
„ —Two-year-olds ..	14 6	12 13	15 4	13 3
„ —Three-year-olds ...	17 9	15 6	16 18	15 8
Polled Scots—Two-year-olds	—	—	16 2	13 19
Herefords— „	15 9	14 5	—	—
Devons— „	15 0	12 7	—	—
Store Sheep:—				
Hoggs, Hoggets, Togs, and Lambs—	s. d.	s. d.	s. d.	s. d.
Downs or Longwools ...	30 1	25 0	—	—
Scotch Cross-breds ...	—	—	21 5	17 2
Store Pigs:—				
Under 4 months	25 7	19 5	19 3	17 9

* Estimated carcase weight.

† Live weight.

AVERAGE PRICES of DEAD MEAT at certain MARKETS in
ENGLAND and SCOTLAND in the Month of October, 1909.

(Compiled from Reports received from the Board's Market
Reporters.)

Description.	Quality.	London.	Birming- ham.	Man- chester.	Liver- pool.	Glas- gow.	Edin- burgh.
		per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
BEEF :—							
English	1st	53 6	50 6	49 0	—	57 0*	57 6*
	2nd	51 6	46 0	46 6	—	54 0*	51 6*
Cow and Bull ..	1st	39 0	43 6	42 0	41 6	42 0	42 0
	2nd	32 6	39 6	37 6	35 6	29 0	36 6
U.S.A. and Cana- dian :—							
Port Killed ...	1st	52 6	49 0	48 0	49 6	50 6	51 6
	2nd	45 0	43 6	44 6	45 0	44 6	—
Argentine Frozen—							
Hind Quarters...	1st	32 0	33 0	32 0	31 6	31 0	34 0
Fore " ...	1st	26 6	27 6	27 0	27 0	27 0	29 0
Argentine Chilled—							
Hind Quarters...	1st	39 0	39 6	38 6	38 0	37 6	39 0
Fore " ...	1st	26 0	28 6	28 6	27 6	28 6	29 6
American Chilled—							
Hind Quarters—	1st	59 6	61 0	60 6	60 6	—	62 0
Fore " ..	1st	36 6	38 0	37 6	37 6	—	38 6
VEAL :—							
British	1st	58 6	56 0	67 6	69 0	—	—
	2nd	52 6	50 0	63 0	65 6	—	—
Foreign	1st	58 6	—	—	—	—	61 0
MUTTON :—							
Scotch	1st	55 6	—	58 6	59 0	56 6	53 0
	2nd	51 6	—	54 6	55 0	39 6	44 0
English	1st	55 0	55 6	56 0	55 6	—	—
	2nd	49 6	49 0	51 6	50 6	—	—
U.S.A. and Cana- dian—							
Port Killed ...	1st	—	—	—	—	—	—
Argentine Frozen ...	1st	38 0	37 6	36 6	36 6	31 0	37 0
Australian " ..	1st	36 6	36 0	35 6	35 6	31 0	—
New Zealand " ..	1st	42 0	—	38 6	38 0	—	—
LAMB :—							
British	1st	—	55 6	—	—	56 6	—
	2nd	—	50 0	—	—	38 6	—
New Zealand ...	1st	45 0	46 0	39 0	40 0	41 0	45 6
Australian ...	1st	39 0	35 6	—	—	31 6	—
Argentine	1st	39 6	41 0	—	—	31 6	—
PORK :—							
British	1st	70 0	68 0	69 0	70 0	60 6	60 6
	2nd	65 6	63 6	63 6	64 0	58 6	51 6
Foreign	1st	67 6	65 6	—	—	—	—

Scotch.

AVERAGE PRICES of British Corn per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1907, 1908 and 1909.

Weeks ended (<i>in</i> 1909).	WHEAT.						BARLEY.						OATS.					
	1907.		1908.		1909.		1907.		1908.		1909.		1907.		1908.		1909.	
	<i>s.</i>	<i>d.</i>	<i>s.</i>	<i>d.</i>	<i>s.</i>	<i>d.</i>	<i>s.</i>	<i>d.</i>	<i>s.</i>	<i>d.</i>	<i>s.</i>	<i>d.</i>	<i>s.</i>	<i>d.</i>	<i>s.</i>	<i>d.</i>	<i>s.</i>	<i>d.</i>
Jan. 2 ..	26	0	35	1	32	0	23	11	26	9	26	7	17	3	18	4	17	4
" 9 ..	26	1	35	2	32	9	24	2	26	9	26	11	17	4	18	3	17	5
" 16 ..	26	1	35	5	32	8	24	1	27	1	27	1	17	5	18	5	17	5
" 23 ..	26	2	35	6	33	2	24	5	26	11	27	3	17	5	18	5	17	8
" 30 ..	26	3	35	0	33	0	24	4	26	11	27	6	17	5	18	4	17	9
Feb. 6 ...	26	6	34	3	33	4	24	5	26	9	27	7	17	7	18	3	17	10
" 13 ..	26	7	33	1	33	8	24	1	26	9	27	8	17	7	18	0	17	11
" 20 ..	26	10	32	6	34	1	24	2	26	5	27	11	17	9	17	11	18	0
" 27 ...	26	9	30	11	34	5	24	2	26	3	28	0	17	9	17	8	18	0
Mar. 6 ...	26	8	30	5	34	10	23	11	26	1	27	11	17	11	17	8	18	2
" 13 ..	26	10	31	3	35	8	24	2	26	0	28	4	18	0	17	10	18	2
" 20 ...	26	10	31	7	35	9	24	0	26	2	28	0	18	1	17	11	18	5
" 27 ...	26	8	31	4	36	0	23	9	25	10	28	0	18	2	17	10	18	6
Apl. 3 ...	26	9	31	3	36	5	24	3	25	5	27	10	18	3	17	9	18	8
" 10 ..	26	8	31	2	37	4	23	9	25	10	28	0	18	6	17	7	18	10
" 17 ..	26	8	30	11	38	7	23	3	26	1	27	8	18	7	17	7	19	2
" 24 ..	26	10	30	10	41	4	23	3	25	5	28	2	18	9	17	9	19	9
May 1 ...	27	0	31	6	42	5	23	6	25	8	27	10	19	3	18	0	20	0
" 8 ...	27	6	32	4	40	9	24	0	25	5	27	7	19	7	18	4	20	3
" 15 ...	28	4	33	1	41	6	23	10	24	9	27	3	20	1	18	7	20	6
" 22 ...	29	7	33	8	42	8	24	3	25	9	27	0	20	5	18	10	20	11
" 29 ...	31	4	33	5	42	6	24	0	24	6	26	3	20	8	18	8	21	0
June 5 ..	32	0	33	1	43	1	24	7	25	10	25	7	20	7	18	4	21	3
" 12 ..	31	10	32	7	42	11	24	7	24	5	26	10	20	11	18	4	21	4
" 19 ..	31	4	32	0	42	7	24	11	24	2	26	10	20	9	18	5	21	6
" 26 ...	31	2	31	5	42	8	24	6	24	0	27	2	20	8	18	7	21	7
July 3 ...	31	3	30	11	42	9	24	8	23	11	27	2	20	11	18	7	21	9
" 10 ..	32	0	30	5	43	0	24	10	24	4	26	4	20	11	18	5	21	8
" 17 ...	32	6	30	7	43	3	24	6	23	1	26	10	21	1	18	5	21	9
" 24 ...	32	11	31	5	44	0	27	3	26	5	27	4	20	8	18	6	22	5
" 31 ...	33	2	31	10	43	5	26	4	24	4	24	6	21	2	18	7	22	2
Aug. 7 ...	33	5	31	6	44	9	26	6	23	1	27	4	21	3	18	9	22	11
" 14 ...	33	6	31	6	44	9	25	9	23	10	24	9	20	4	18	1	21	8
" 21 ...	33	7	31	2	41	6	25	0	24	5	23	11	19	8	17	10	19	8
" 28 ...	33	10	30	10	38	5	24	6	24	5	24	7	18	11	17	1	19	4
Sept. 4 ...	31	11	30	10	37	2	24	2	25	5	26	3	17	7	17	3	19	6
" 11 ...	31	4	31	5	34	11	24	4	25	11	26	1	17	6	17	6	18	5
" 18 ...	31	5	31	7	33	6	25	0	26	0	26	5	17	6	17	3	17	9
" 25 ...	31	8	31	5	32	9	25	3	26	8	26	8	17	8	17	2	17	7
Oct. 2 ...	32	6	31	7	32	2	25	5	26	11	26	9	17	9	17	2	17	2
" 9 ...	33	3	31	5	31	8	25	9	27	5	26	9	17	11	17	0	17	0
" 16 ...	34	4	31	2	31	4	26	3	27	6	27	0	18	0	17	0	17	0
" 23 ...	35	9	30	11	31	8	27	2	27	5	27	7	18	7	16	11	16	11
" 30 ...	36	3	30	8	31	10	27	7	27	5	27	9	18	10	16	11	17	0
Nov. 6 ...	35	10	30	11	32	5	27	8	27	6	27	9	18	10	17	0	17	0
" 13 ...	35	1	31	2			27	8	27	4			18	8	17	0		
" 20 ...	34	7	31	10			27	5	27	3			18	9	17	3		
" 27 ...	34	7	32	3			27	5	27	2			18	7	17	5		
Dec. 4 ...	34	7	32	7			27	1	27	2			18	6	17	4		
" 11 ...	34	8	32	8			27	0	27	0			18	5	17	4		
" 18 ...	34	9	32	9			27	1	26	9			18	3	17	3		
" 25 ..	34	6	32	2			26	10	26	8			18	0	17	2		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lbs.; Barley, 50 lbs.; Oats, 39 lbs. per Imperial Bushel.

AVERAGE PRICES of Wheat, Barley, and Oats per Imperial Quarter in FRANCE, BELGIUM, and GERMANY, and at PARIS, BERLIN, and Breslau.

		WHEAT.		BARLEY.		OATS.	
		1908.	1909.	1908.	1909.	1908.	1909.
		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
France :	September	38 7	39 6	25 9	25 9	19 11	20 9
	October	38 8	39 6	25 11	25 4	20 1	20 3
Paris :	September	39 9	41 5	26 2	27 7	20 7	19 8
	October	39 2	40 6	26 2	24 8	20 8	19 5
Belgium :	July	34 5	48 0	25 1	26 1	21 2	26 8
	August	34 5	42 8	25 4	24 8	20 9	24 5
	September	34 3	35 6	24 9	24 3	19 7	20 5
Germany :	August	42 11	49 1	27 9	28 4	22 0	24 5
	September	42 1	44 1	29 10	27 3	21 9	21 6
Berlin :	August	43 8	51 10	—	—	22 6	23 9
	September	44 3	45 8	—	—	22 9	21 10
Breslau :	August	43 9	53 2	30 8 (brewing)	28 11 (brewing)	20 6	26 5
				26 0 (other)	25 9 (other)		
				30 8 (brewing)	28 8 (brewing)		
				26 0 (other)	25 1 (other)		
	September	43 10	43 10	—	—	20 10	26 5

NOTE.—The prices of grain in France have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*; the Belgian quotations are the official monthly averages published in the *Moniteur Belge*; the German quotations are taken from the *Deutscher Reichsanzeiger*, the prices for the German Empire representing the average of the prices at a number of markets.

AVERAGE PRICES of British Wheat, Barley, and Oats at certain Markets during the Month of October, 1908 and 1909.

		WHEAT.		BARLEY.		OATS.	
		1908.	1909.	1908.	1909.	1908.	1909.
		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
London ..	...	32 4	32 10	28 10	27 4	17 9	17 6
Norwich	...	30 8	31 11	27 2	25 1	16 10	16 8
Peterborough	...	30 2	30 6	27 5	28 3	16 4	16 1
Lincoln...	...	30 3	30 8	27 2	27 11	16 5	17 3
Doncaster	...	30 4	30 2	26 0	27 0	16 10	17 4
Salisbury	...	31 6	32 2	28 8	26 10	17 0	17 8

AVERAGE PRICES of PROVISIONS, POTATOES, and HAY at certain MARKETS in ENGLAND and SCOTLAND in the Month of October, 1909.

(Compiled from Reports received from the Board's Market Reporters.)

Description	London.		Bristol.		Liverpool.		Glasgow.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
BUTTER :—	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British	14 6	13 6	14 0	12 9	—	—	15 0	—
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery	118 6	114 0	118 0	115 0	117 6	113 6	119 0	—
„ Factory	106 6	101 6	105 0	98 6	103 6	95 0	—	—
Danish ..	130 0	128 0	—	—	130 6	128 0	130 0	—
Russian	108 6	105 6	108 6	99 0	108 6	105 0	108 6	103 0
Canadian	116 0	114 6	117 6	114 0	115 0	112 0	117 6	—
Australian	113 6	111 6	112 6	104 6	—	—	119 0	—
New Zealand	118 6	115 0	115 0	110 6	121 0	119 0	—	—
CHEESE :—								
British—								
Cheddar	78 0	59 6	74 0	60 6	73 0	68 0	64 0	61 0
	120 lb.	120 lb.	—	—	120 lb.	120 lb.	—	—
Cheshire	80 6	73 6	—	—	71 0	64 0	—	—
	per cwt.	per cwt.	—	—	per cwt.	per cwt.	—	—
Canadian	57 0	56 0	57 6	55 0	57 0	55 0	58 0	55 0
BACON :—								
Irish ...	71 6	68 6	73 6	69 0	71 6	68 6	72 0	69 0
Canadian	67 0	—	69 0	67 0	68 0	65 6	68 0	66 0
HAMS :—								
Cumberland ..	104 0	90 0	—	—	—	—	—	—
Irish ...	102 0	93 6	—	—	—	—	100 6	90 6
American (long cut)	64 0	—	66 0	63 6	67 0	62 6	65 6	63 6
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British	15 10	14 4	11 8	10 10	—	—	—	—
Irish ...	13 9	12 7	11 2	10 8	11 7	10 11	13 0	10 6
Danish	12 7	11 4	—	—	11 10	10 11	11 8	10 4
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
British Queen	55 0	50 0	54 6	43 0	42 6	42 6	41 0	38 6
Edward VII.	55 0	50 0	52 6	41 0	41 0	41 0	41 0	38 6
Gloucester	55 0	51 0	52 6	45 0	45 0	45 0	45 0	40 0

DISEASES OF ANIMALS ACTS, 1894 to 1903.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered

GREAT BRITAIN

(From the Returns of the Board of Agriculture and Fisheries)

DISEASE	OCTOBER.		TEN MONTHS ENDED OCTOBER	
	1909	1908	1909	1908.
Swine-Fever —				
Outbreaks	109	169	1,432	1,762
Swine Slaughtered as diseased or exposed to infection	877	1,483	12,801	10,883
Anthrax —				
Outbreaks	110	100	1,099	920
Animals attacked	128	118	1,439	1,210
Foot-and-Mouth Disease —				
Outbreaks	—	—	—	3
Animals attacked	—	—	—	112
Glanders (including Farcy) —				
Outbreaks	38	58	464	693
Animals attacked	104	219	1,619	2,151
Sheep-Scab —				
Outbreaks	22	16	498	663

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland)

DISEASE	OCTOBER.		TEN MONTHS ENDED OCTOBER	
	1909	1908	1909.	1908.
Swine-Fever:—				
Outbreaks	—	11	86	152
Swine Slaughtered as diseased or exposed to infection ..	7	287	1,561	3,534
Anthrax:—				
Outbreaks	2	—	8	7
Animals attacked	2	—	8	10
Sheep-Scab:				
Outbreaks	21	19	330	300

ADDITIONS TO THE LIBRARY.

[NOTE.—The receipt of *annual* publications of foreign agricultural and other departments, experiment stations, and societies is not noted in the monthly list of additions to the Library.]

Agriculture, General and Miscellaneous

M'Cutcheon, Jas.—The Principles of Agriculture. (207 pp.) Edinburgh : E. and S. Livingstone, 1909. 3s. 6d. net.

U.S. Department of Agriculture, Office of Experiment Stations.—Circ. 84 :—Education for Country Life. (40 pp.) Washington, 1909.

U.S. Department of Agriculture.—Farmers' Bulletins. No. 368 :—The Eradication of Bindweed or Wild Morning-Glory. (19 pp.) No. 370 :—Replanning a Farm for Profit. (36 pp.) Washington, 1909.

U.S. Department of Agriculture, Bureau of Plant Industry.—Bull. 153 :—Seeds and Plants imported from October 1st to December 31st, 1908. (58 pp.) Bull. 141 :—Miscellaneous Papers. (56 pp.) Bull. 157 :—The Truckee-Carson Experiment Farm. (38 pp.) Washington, 1909.

Deutsche Landwirtschafts-Gesellschaft. Arbeiten. Heft 160 :—Mittlere Zusammensetzung der wichtigsten Wirtschaftsdünger und Handelsdünger (Coloured Diagram). Heft 161 :—Ueber Beziehungen zwischen Pflanzenphänologie und Landwirtschaft. (35 pp.) Berlin : Paul Parey, 1909. 2.50 M. and 1.50 M. respectively.

Reports upon the Irish Peat Industries : Part I., by Hugh Ryan. [Economic Proceedings of the Royal Dublin Society, Vol. I., Pt. 10.] (371-420 pp., with 3 plates.) Dublin : Royal Dublin Society, 1907. 2s.

Wilfarth, H., Romer, H., and Wimmer, G.—On the Assimilation of the Elements of Nutrition by Plants during different Periods of their Growth. (72 pp. and 2 coloured plates.) London : Vinton & Co., n.d. 1s.

Hendrick, J.—The Lime in Basic Slag. (14 pp.) [Reprinted from the Journal of the Society of Chemical Industry, No. 14, Vol. XXVIII.]

Horner, D. W.—Observing and Forecasting the Weather. Meteorology without instruments. 2nd Edition. (48 pp.) London : Witherby & Co., 1909. 6d.

Russia, Department of Agriculture.—Root-System of Cultivated Plants of One Year's Growth. (57 pp.) Odessa : South Russian Printing Co., 1909.

State College of Washington, Agricultural Experiment Station, Department of Chemistry.—Bull. 88 :—(1) Lime as a Fertiliser. (2) Farm Practices in Applying Land Plaster in Western Oregon and Western Washington. (24 pp.) Pullman, Washington, 1909.

Ohio State University Bulletin.—Vol. XII., Supplement B to No. 6 :—Opportunities for Young Men in Agriculture. (8 pp.) 1908. Vol. XIII., No. 7 :—College of Agriculture and Domestic Science. (85 pp.) Columbus, Ohio, 1909.

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Colonial Office.—Miscellaneous Reports, No. 61 : Report on Agriculture and Viticulture in South Africa. [C'd. 4909.] (25 pp.) London : Wyman and Sons, 1909. 2d.

Field Crops

Palmer, T. G.—The Sugar Beet Industry as affecting American Agriculture. (16 pp.) [An Address delivered at the Trans-Mississippi Commercial Congress at Denver, Colorado, August, 1909.]

U.S. Department of Agriculture.—*Farmer's Bulletins.* No. 362 :—Conditions affecting the Value of Market Hay. (29 pp.) No. 364 :—A Profitable Cotton Farm. (23 pp.) No. 365 :—Farm Management in Northern Potato-Growing Sections. (31 pp.) Washington, 1909.

U.S. Department of Agriculture, Bureau of Plant Industry.—Circ. 30 :—Improvement of the Oat Crop. (10 pp.) Bull. 156 :—A Study of Diversity in Egyptian Cotton. (60 pp.) Washington, 1909.

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Yearbook of the Khedivial Agricultural Society.

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Reports upon the Botanical and Agricultural Department.

Natal.

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Agriculture, General and Miscellaneous—

M'Cutcheon, Jas.—The Principles of Agriculture. (207 pp.) Edinburgh : E. and S. Livingstone, 1909. 3s. 6d. net.

U.S. Department of Agriculture, Office of Experiment Stations.—Circ. 84 :—Education for Country Life. (40 pp.) Washington, 1909.

U.S. Department of Agriculture.—Farmers' Bulletins. No. 368 :—The Eradication of Bindweed or Wild Morning-Glory. (19 pp.) No. 370 :—Replanning a Farm for Profit. (36 pp.) Washington, 1909.

U.S. Department of Agriculture, Bureau of Plant Industry.—Bull. 153 :—Seeds and Plants imported from October 1st to December 31st, 1908. (58 pp.) Bull. 141 :—Miscellaneous Papers. (56 pp.) Bull. 157 :—The Truckee-Carson Experiment Farm. (38 pp.) Washington, 1909.

Deutsche Landwirtschafts-Gesellschaft. Arbeiten. Heft 160 :—Mittlere Zusammensetzung der wichtigsten Wirtschaftsdünger und Handelsdünger (Coloured Diagram). Heft 161 :—Ueber Beziehungen zwischen Pflanzenphysiologie und Landwirtschaft. (35 pp.) Berlin : Paul Parey, 1909. 2.50 M. and 1.50 M. respectively.

Reports upon the Irish Peat Industries : Part I., by Hugh Ryan. [Economic Proceedings of the Royal Dublin Society, Vol. I., Pt. 10.] (371–420 pp., with 3 plates.) Dublin : Royal Dublin Society, 1907. 2s.

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Agricultural Statistics (British India).

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Memoirs of the Department of Agriculture in India (Botanical Series).

Statistical Abstract relating to British India.

Bengal.

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Bombay.

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Annual Report of the Department of Land Records and Agriculture

Madras

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Season and Crop Report

Punjab

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United Provinces of Agra and Oudh.

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- Administration of the Department of Agriculture.
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- Government Botanical Gardens, Saharanpur and Mussoorie.
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- Season and Crop Report.

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Résumé Statistique de l'Empire du Japon.

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- Official Year Book of the Commonwealth of Australia
- Records of the Australian Museum.
- Year Book of Australia.

New South Wales.

- Annual Report of the Department of Agriculture
- Official Year Book.
- Statistical Register.

Queensland.

- A.B.C. of Queensland Statistics
- Annual Reports :—
- Bureau of Sugar Experiment Stations.
- Department of Agriculture.
- " " " and Stock.
- " " Public Lands.
- Government Statistician on Agricultural and Pastoral Statistics
- Statistics of the State.
- Vital Statistics.

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- Agricultural and Live Stock Statistics
- Annual Progress Report on State Forest Administration.
- Report of the Chief Inspector of Stock.
- Statistical Register.

Victoria.

- Department of Agriculture, Bulletins and Guides to Growers
- Report of the Department of Agriculture
- Victorian Year Book.

Western Australia.

- Annual Report of the Department of Agriculture
- Blue Book.
- Statistical Register.

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- Census and Statistics Bulletins.
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Annual Reports of the Department of Agriculture, of the Bureau of Animal Industry, and of the Office of Experiment Stations.

Bulletins and Circulars of the following Bureaus and Divisions :—

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Year Book of the Department of Agriculture.

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Report on Sugar Cane Experiments conducted at Antigua and St. Kitts.

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Report of the Board of Agriculture, and of the Botanic Gardens.

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Report on the Botanic Station, Agricultural Instruction, and Experiment Plots.

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Annual Report of the Board of Agriculture, the Public Gardens and Plantations, the Island Chemist.

St. Lucia.

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(To be continued.)

THE JOURNAL

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THE AGRICULTURAL RESOURCES OF ARGENTINA.

HERBERT GIBSON

(Hon. Delegate for the Argentine International Exhibition of Agriculture, 1910.)

THE results of a rural census, taken simultaneously throughout the whole territory of the Argentine Republic in May of last year, have recently been published, and reveal many subjects of interest connected with the resources of that country as regards its agricultural and pastoral industries.

The total area of the Republic is 729,280,000 acres. Of this area the returns show that 40 per cent. is at the present time under one or another form of rural exploitation, including that of live-stock breeding upon natural grass lands. The various areas of cultivated land are as follows:—

Wheat	...	...	...	...	...	...	11,989,592 acres
Oats	...	...	...	...	...	...	954,065 "
Barley	...	...	...	...	...	...	231,412 "
Maize	...	...	...	...	...	...	4,793,985 "
Linsced	...	...	...	...	...	...	3,129,060 "
Alfalfa (Lucerne)	...	...	...	...	...	...	11,502,067 "
Permanent sown grasses and fodder plants	...	...	...	...	...	...	5,118,257 "
Vineyards	...	...	...	...	...	...	302,469 "
Sugar cane	...	...	...	...	...	...	174,659 "
Tobacco	...	...	...	...	...	...	23,577 "
Cotton, jute and other vegetable fibres (exclusive of linseed)	...	...	...	...	...	...	24,979 "
Fruit trees	...	...	...	...	...	...	554,041 "
Other tree plantations	...	...	...	...	...	...	1,083,695 "
Rice, castor oil and various...	...	...	...	...	...	...	225,940 "
Vegetables	...	...	...	...	...	...	164,793 "
Total	...	...	...	...	...	...	40,271,991 "

The greatest area of land under agriculture lies between the rainfall curves of 24 inches and 32 inches annually, and may be broadly described as a belt varying in width from

250 to 90 miles and of a total length of 600 miles. It extends from the 28th to the 38th degree of latitude S., and westerly from the seaboard of the Atlantic to the 65th meridian W. The area within this belt available for the cultivation of cereals may be estimated, very roughly, at 60 million acres. To the west of the curve of 24 inches of annual rainfall, lying between that and the curve of 18 inches of rainfall, is a belt of an average width of 100 to 120 miles and stretching from the 40th to the 28th degree of latitude S., in a N.W. to S.E. direction. The soil of this drier belt, though lighter than that to the east of it, is also available for the cultivation of cereals, and the area may be estimated at 30 million acres. West and south of the curve of 18 inches the rainfall becomes less, and cultivation—except by irrigation—offers little encouragement to the colonist. East of the curve of 32 inches of rainfall lie the alluvial soils of the River Plate and its tributaries, including the Provinces of Entre Rios and Corrientes, and the major part of the Province of Santa Fé, and here the rainfall increases up to 40 inches per annum. Described broadly, therefore, the agricultural zone of the Argentine Republic stretches from the Atlantic seaboard in the east to the 67th meridian west, and from the 28th to the 40th degree of latitude S., and is represented, very roughly, by an area of 120 million acres.

An estimate of the total acreage within this area available for wheat-growing can be at best but conjectural. It excludes zones where, notwithstanding the scant rainfall, irrigation can be called to the aid of the agriculturist; as, for example, in the Chubut Valley (lat. 43° S.), where a hardy colony of Welshmen, toiling in a remote and ungenerous region, have made fertile a barren and arid soil—a lasting monument to the restless energy of the Celt. It includes zones where local conditions favour other branches of agriculture, or where the excellence of the permanent pasture keeps the plough from the land. It is, indeed, almost superfluous to say that wherever wheat can be grown it does not necessarily follow that it will be grown, or will be grown continuously. Although the cultivation of wheat has naturally followed the line of least resistance, and has been introduced to the zones where the soil, climate and transport facilities combined to offer

the most favourable conditions for its practice, the increase of the wheat area in Argentina depends upon the increase of the rural population and on the construction of more railways. It is by these, and not by any limitation, so-called, of the available wheat area that the augmentation of the wheat production of the Republic is to be measured. It would be as conjectural to state that when 30 million acres are under wheat in that country the available area had been fully occupied, as it was conjectural ten years ago to place the limit of that available area at 15 million acres.

The average yield of wheat in Argentina is 800 kilogrammes per hectare, or say 11.3 bushels per acre. Apart from the large area of land available for wheat and not yet put under cultivation, the question not unnaturally arises whether the intensiveness of the production is not likely to increase. Perhaps it may be conceded that, apart from the ravages of locusts and other accidental causes contributing to diminish the average return from so extensive an area, the rapid change from mild spring to the hot suns of early summer, and the quickness with which the cereals ripen, may affect the yield as compared to the slower growth of the English climate. How far climatic conditions may permanently affect the wheat return has scarcely yet been determined by Argentine experience; but the cause of the comparatively small yield per acre may be more rightly attributed to the insufficient cultivation and the rude husbandry in a field where the labourers are still few and unskilled. In England, in the fourteenth century, the wheat return varied from 8 to 12 bushels per acre, and even in the sixteenth century, when husbandry had improved and lands were dressed, the return is stated by Harrison, a contemporary writer, to have been from sixteen to twenty bushels. What experience and science have done for England they can do for other countries. As the rural population in Argentina increases and the land rises in value more intelligent cultivation will obtain, and the result will be a heavier return from the soil. The improvement in that yield is more likely to come by way of cultivation, of conservation of the soil moisture, and of selection of seeds than by the use of fertilisers.

The cultivation of oats in Argentina is now becoming general, and the area under this plant will increase rapidly. The economy of making a proper winter provision for the feeding of live stock has of late come to the front, and the bitter experience of the recent drought will accelerate the conviction that all cannot be left to nature. Oats for green feed, for straw and for the stall, hay-making on a much more extensive scale than has hitherto been practised, and the cultivation of forage plants, are all features that will soon become common-places on the Argentine stock-farm. Indeed, except in the still virgin plains of the far south and west, the days of the "ranch" are ended, and the plough has come to stay.

Live Stock.—The total live stock in the Republic in the month of May, 1908, numbered as follows :—

Cattle	29,116,625
Sheep	67,211,754
Horses	7,531,376
Mules and asses	750,125
Goats	3,945,086
Pigs	1,403,591

The census was taken in the month of May, immediately before the general annual lambing, and three to six months before the general annual calving and foaling. The numbers, therefore, represent the minimum or lowest level of the live-stock capital of the country.

The total number of breeding cows was 14,989,804. Of this number 5,791,591 were returned as "criolla" or unimproved animals, and 8,198,213 as "mestiza" or improved animals. The latter, classified according to their breeds, were as follows :—

Shorthorn	7,090,820
Hercford	519,704
Polled Angus	115,561
Red Poll	1,607
Jersey	1,880
Flemish	2,723
Dutch	20,458
Swiss	2,105
Not specified	443,355

The sheep stock, classified by age and sex, comprised the following :—

Rams	1,005,237
Ewes	40,639,731
Wethers, shearlings and upwards	9,261,936
Wethers and wether hoggets	14,189,121
Lambs	2,115,729

Of the above 41,644,968 rams and ewes, 7,022,390 were returned as "criolla" or unimproved, and the remainder were classified as follows:—

Merino (Rambouillet and Negrete)	9,350,205
Lincoln	18,307,216
South Down	300,209
Shropshire	304,950
Leicester	90,488
Not specified	6,268,510

This is an unsatisfactory schedule, the breed of more than one-sixth of the "improved" sheep remaining unascertained. Romney Marsh sheep are bred in considerable numbers, especially in the Province of Entre Rios and in the southern territories of Patagonia. Hampshire and Oxford Downs are bred more or less in the same numbers as Shropshires and South Downs. It is to be regretted that more ample schedules were not provided for the returns of the breeds of sheep.

Of 2,402,819 brood mares only 711,791 are returned as "mestiza" or improved, and as of these 320,608 are given as of no specified breed the field of investigation is somewhat arid. The predominant breeds are as follows:—

Percheron	134,633
Clydesdale	126,325
Shire	3,112
Suffolk Punch	2,734
Hackney	26,164
Normandy	38,820
Cleveland	6,687
Yorkshire	10,033
Arab... ..	16,258

Though not unexpected, the return of the cattle census, exhibiting a total minimum capital of nearly thirty million head, reveals that it is in regard to this class of stock that the pastoral development of Argentina during the past twelve years has been most active. The census taken in 1908 is no doubt a more accurate and complete one than those taken in earlier years, but a comparison with the latter is not un instructive:—

	1875.	1895.	1908.
Cattle	13,337,862	21,701,526	29,116,625
Sheep	57,501,261	74,379,562	67,211,754
Horses... ..	3,915,706	4,446,859	7,531,376
Mules and asses ..	290,277	483,369	750,125
Goats	2,863,227	2,748,860	3,945,086
Pigs	257,368	652,766	1,403,591
<i>Value, ...</i>	<i>£39,027,103</i>	<i>£75,785,380</i>	<i>£130,352,838</i>

The cultivation of alfalfa (lucerne) in the western lands has created an adequate grazing area for the preparation of beef cattle, and the development of the chilled-beef trade has provided a corresponding market. Chilled beef is kept at a uniform temperature not exceeding 29.2° Fahr. or descending below 27.2° Fahr., under which conditions the juice vessels underlying the surface are not contracted sufficiently to cause them to burst when expanded under the thawing process—this being the demerit of frozen beef. The improvement in the quality of the cattle has for its direct cause the chilled-meat trade allied to the alfalfa grazing zone. Of 14 million odd breeding or “wet” cows nearly one-half have been scheduled as Shorthorns. The Shorthorn breed is that which predominates, and it is likely to continue to do so, though Argentine breeders are not obsessed by any prejudice against other breeds. It may be mentioned that there are 49,750 head of pedigree cattle registered in the Herd Books of the Argentine Rural Society, and of these 27,268 are females. 7,360 of the foregoing are imported, and 42,390 were born in the country. The number of Shorthorns on the Register (exclusive of Lincoln Reds) is 36,649.

With eleven and a half million acres of alfalfa, affording a grazing area for ten million cattle, Argentina is fully equipped to fatten and finish for the requirements of the European and local markets all the steers the country can breed. Stock-owners in the alfalfa zones do not raise all the stores they require; many of them, indeed, do not breed at all, but limit themselves to buying stores and fattening them. As the alfalfa area increases—and it is increasing very rapidly—the question arises whether the country can breed sufficient stores for the graziers. The question already has arisen to this extent, that in normal seasons yearling steers have been selling of late, in store condition, at prices relatively higher than those obtained for finished bullocks. In other words, the breeder has had command of the trade. Nevertheless the breeding area of Argentina is very vast, and much unused land is still available. In the widening alfalfa zone, too, the grazier will in time use his rich pasture for breeding as well as for feeding.

Machinery.—The machinery, appliances, and tools re-

quired for the cultivation of the enormous area under crops and for the harvesting of the produce are almost entirely imported from foreign countries. In addition to this the pastoral industry of the Republic creates a constantly increasing demand for fencing wire, windmills, pumps, and other pastoral equipments. An examination of the sources of supply of various requisites brings into evidence the small participation of British industry in the import trade to Argentina of agricultural machinery and appliances. The bulk of the reapers and binders, drills, hay-baling presses, ploughs, binding twine, windmills, and pumps is imported from the United States of America, while harrows and iron and steel wire chiefly come from the United States and Germany. The United Kingdom, however, supplies most threshing machines, bags and sacking, and a good deal of iron and steel wire. British-made goods are popular, and the labourer shows a preference for them when he gets them, but their trade is apparently not very actively pushed.

Education.—The progress attained by Argentina in the development of pastoral and agricultural industries has awakened a corresponding attention to agricultural education and to scientific research work. It is recognised that there is no subject of greater immediate importance than that of securing for the rural population the means for acquiring a reasoned knowledge of the sciences relating to the pursuits in which they are engaged. Agricultural colleges and experimental stations have already been established in various parts of the country and considerable sums of money have been voted by Congress to endow them.

Working in a new field, and without many texts in the Spanish language to assist them, the Argentines have turned to more experienced countries to investigate the educational systems most suitable to their own requirements. In this respect the United States have exhibited a foresight that might with advantage be followed by other countries interested in the promotion of their commercial relations with Argentina. Facilities have been afforded by the United States for Argentine students to enter their agricultural colleges and pursue their studies there. This friendly and wise provision will have a sure recompense. Argentine

students educated in the United States, whether they return to their own country to practise agriculture or to teach its science there, will have their ideas founded on American methods and practice and will be familiar with American industrial appliances. With or without intention, and however remote from such material aims the hospitable policy of the United States may have been, they will be largely the commercial agents of United States industry and assist to promote the trade interests of that country.

It is somewhat remarkable that the United Kingdom, with thirty-three universities and colleges connected with agricultural education, with numerous institutions for scientific research and experimental work, with a record not only in the practice but in the precepts of agricultural science entitling it to rank at any rate equal to other civilised countries, should be so modest of its own achievements that little news of them is allowed to travel abroad. It is currently believed in Argentina that the British, so successful as practical stock-breeders and agriculturists, concern themselves little about the sciences in whose application they are engaged; a state of affairs which, were it true, would be indeed singular.

Buenos Ayres Exhibition.—Next year there will be held in Buenos Ayres an International Agricultural Exhibition to celebrate the first centenary of the 1810 May Revolution, which culminated in the independence of the Republic. There are special sections for the exhibition of scientific research work and agricultural education. If the question be asked whether it will "pay" to exhibit in these sections, the answer must be that there is no material reward offered to recompense the outlay occasioned by taking part in what is, in the first instance, an academical display. But so surely as commerce followed in the wake of the Elizabethan "ships of fools," the knowledge conveyed of what Great Britain is doing in scientific investigation and in agricultural education will open the road to reciprocal and material benefits.

[Information respecting the Exhibition will be found on p. 765.]

TRIALS OF WILD WHITE CLOVER.

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WHITE or Dutch clover (*Trifolium repens*) has been grown by English farmers since 1764* or earlier. In that year the Society of Arts awarded a premium of £20 to a Wiltshire agriculturist for growing 21¼ cwt. of the seed of this plant, and a similar premium was awarded for the same purpose in the following year. The Society's object was to encourage the growing of the seed in this country, instead of importing it from Holland, as was then the custom. Red, or broad-leaved clover (*Trifolium pratense*) had been in common use in England long before this time, as Walter Blyth, in the *English Improver Improved* (third edition, 1652), describes the cultivation of this crop. It had then probably been recently introduced. Blyth, speaking of this clover, states: "Your Dutch, Holland, or Low Country seed, or from the lower parts of Germany, is very much of it very hazardous that comes over hither." Again he says: "From the experience my self hath made, I doe affirm that our own seed, that is, seed of our own clover, after the first sowing of the Dutch seed, called the great clover, is the best and most certain seed to grow." He gave as reasons the difficulty of getting good seed, and the right kind of seed, from abroad. In this connection it is interesting to record that successive trials at Cockle Park, Northumberland, have decidedly indicated that English-grown clover seed produces plants which stand the climatic conditions of the north-east of England better and are longer lived than almost any grown from imported clover seed. Woolridge, in his *Systema Agriculturae* (1681), fully describes the cultivation of this clover, and mentions that it "usually decayeth at three years' growth." From what he says it is evident that the harvesting of clover seed was then quite common in the south of England.

In Gerarde's *Herball*,† 1597, red clover, or *Trifolium pratense*, is called "Meadow Trefoile," and it is there stated that "There is also a trefoile of this kinde, which is sowed in

* Dossie's *Memoirs of Agriculture*, Vol. I., p. 58.

† First edition, p. 1018.

fieldes of the lowe countries." It is evident from the description which follows that this was cultivated red clover.

In Dossie's *Memoirs of Agriculture*, Vol. I., p. 365 (1768), a writer suggests that "there is a perennial sort of red clover, that grows commonly enough on many of our meadows, which would be extremely well worth cultivating." He found that the ordinary broad-leaved clover "lasts but a year or two." From the foregoing it is evident that both white clover and red clover had been cultivated in Holland and Flanders before their introduction to England, probably for a very considerable time. There can be no doubt that the longer these clovers have been cultivated from their original natural condition, the more they have developed "early maturity" and greater vigour in their earlier stages, but, at the same time, they have gradually lost their hardiness and perennial character. From Blyth's account of the growth of red clover in England in the seventeenth century, it appears that at that period of its history its term of growth was three years, and it seems quite probable that it has since then gradually become a shorter-lived plant, as it usually does not now last so long.

A further difficulty with red clover as now grown, in common with all cultivated leguminous crops, is that land soon becomes "sick" of these crops when they are grown in succession or too frequently. An interesting question that arises is, Does land become "sick" of the wild or native forms of clovers and allied plants? Gorse, a leguminous plant, continues to grow year after year in its natural habitats without any apparent tendency to gorse sickness. The leguminous plants, indigenous to districts, evidently continue to grow year after year, with about the same vigour and in the same numbers. Favourite habitats of the leguminous plants, like the Great Orme at Llandudno (on limestone), apparently continue to grow these plants for centuries. Much evidence is accumulating, too, that the continued use of basic slag and other manures which encourage white clover and other natural leguminous herbage, will keep these plants growing healthily for long periods of years. All this indicates that a return to native or wild forms of white and red clovers may have excellent results on clover-sick land.

Wild white clover has now engaged attention for some time. In 1886 the Royal Manchester, Liverpool, and North Lancashire Agricultural Society commenced grass and clover seeds' experiments on the late Mr. W. E. Gladstone's Hawarden estate at Broughton Hall, near Chester, on Mr. John Roberts's farm at Saltney. The late Mr. Thomas Rigby, of Cheshire, who was such an indefatigable worker in the cause of agriculture, showed the writer these experiments in 1891. In 1886 some small plots had been sown down, (a) with grasses only, (b) with grasses and cultivated white clover, and (c) with grasses and wild white clover. Five years later (a) had as much white clover present as (b), but only a few scattered plants in each case, which were undoubtedly natural to the soil. On the other hand (c) had an abundance of clover plants present. It was perfectly evident that wild white clover seed had produced perennial plants, whereas the plants produced from the cultivated or commercial white clover seed had disappeared within a year or two, although they had come up all right after sowing. The wild white clover seed was collected from old and natural pastures in Kent. This produced smaller plants, which spread considerably further than the plants produced from commercial seed.

In 1906 an excellent opportunity presented itself at Cockle Park for testing wild white clover. A small area of the poorest type of boulder clay soil in Tower Hill field had been summer fallowed in 1905, and was sown with wheat in the autumn. In April, 1906, four one-quarter acre plots were marked off and two of them sown with the following seeds (per acre):—

	Plot 1	Plot 2
Perennial rye grass	6 lb	6 lb
Italian rye grass	6 "	6 "
Cocksfoot	6 "	6 "
Timothy	3 "	3 "
Meadow fescue	8 "	8 "
Red clover	4 "	4 "
Alsike clover	2 "	2 "
White clover	4 "	4 "
Wild white clover	—	4 "

Plots 1 and 2 had exactly the same seeds' mixtures, except that Plot 2 had, in addition, 4 lb. wild white clover seed. The seeds for Plot 1 cost about 23s. an acre, and as the wild white clover seed for Plot 2 cost 1s. 6d. a pound, the seeds for

Plot 2 cost 29s. an acre. These plots have now produced hay for three years with the following results (per acre):—

				Weight of hay.	
				Plot 1.	Plot 2.
1907	..	...	...	30½ cwt.	35 cwt.
1908	..	...	...	18½ „	28½ „
1909	...	...	..	15½ „	21½ „
Average	...	...	...	21½ „	28½ „

The aftermath has been grazed every year. White clover, and practically all the clovers, disappeared from Plot 1 after the first year, but now some natural clover plants are spreading on this plot. Plot 2 has always had a thick and close sward of white clover, and this continues to be so. It may be noted that on this cold clay soil meadow fescue seed has failed to produce plants. A striking result is that on Plot 1 the grasses have not been nearly so luxuriant as on Plot 2. This was so even in the first year's hay crop, and is undoubtedly due to the collection of nitrogen from the atmosphere by means of the nodules on the clover roots, and to the stimulating effects of the nitrogen on the grasses.

A further four acres of similar poor clay soil in the same field was sown down a year later with the seeds' mixture of Plot 2, but with cultivated white clover omitted; the seeds being again sown on young wheat, after summer fallow. The resulting hay crops in 1908 and in 1909 have been excellent, and there is now a beautiful sward of white clover. This land received 10 cwt. per acre of high quality basic slag after the wheat crop was removed in 1907, and this has had a remarkable effect in developing the clover plants. The crops of hay (per acre) averaged 32 cwt. in 1908, and 37 cwt. in 1909—very satisfactory crops for this poor clay soil.

The same seeds' mixture was sown, in 1908, with barley, on about 5 acres of poor clay soil in Upper Brick field. This was also dressed with slag when the barley crop was removed, and the crop of excellent hay produced in 1909 averaged 2 tons per acre.

In 1909 the rotation hay in East Tower Hill field was a considerably lighter crop than this (35 cwt. per acre), though up till February there were good clover plants on this field, all produced from cultivated clover seeds, principally red clover; by May, however, the clover plants had practically

disappeared, in common with much of the young clovers throughout Northumberland last spring. This disappearance of clover is, unfortunately, far too common in Northumberland and the North of England, and is probably not due to clover sickness only, but largely to cultivated clovers not being hardy enough to stand the rigorous springs of the North. The experiments already quoted indicate that where these clovers are liable to disappear, the inclusion of a small amount (say 2 lb. per acre) of wild white clover may be very useful, even in a seeds' mixture for one year.

It may be predicted with confidence that the inclusion of wild white clover seed in a seeds' mixture for laying down land to hay or pasture, especially on strong clay soils, will produce a sward practically immediately, and if this be so the series of years hitherto necessary to accomplish this will to a large extent be bridged over.

A remarkable result is the rapidity with which basic slag has acted where this clover has been sown at Cockle Park. On Lord Londonderry's estate at Wynyard (County Durham), where one of the poorest pastures on a cold boulder clay soil has been drained, dressed with 10 cwt. per acre of high quality slag in November, 1908, and sown with 12 lb. wild white clover seed per acre in April, 1909, there is now a capital sward of white clover where the soil and subsoil left on the surface after draining has been sufficient to give a seed-bed to the clover seeds. Where, however, there is much benty herbage and no loose soil the sown clover has not established itself, although basic slag has greatly developed the clovers and allied plants naturally present in the pasture.

Wild white clover seed is now offered by several seed merchants and is produced from meadows in the South of England, where white clover indigenous to the soil has been developed by basic slag or other manures which encourage this clover. It is difficult to collect such seed in the North of England, where the climate is not favourable to the harvesting of clover seed for market purposes.

It is desirable that wild red clover seed should also be collected and placed on the market by seed merchants, as there is every likelihood that this plant will prove equally

valuable to farmers who cannot grow the usual cultivated clovers successfully, and also for laying down hay or pasture for several years or permanently.

In Bailey and Culley's *Agriculture of Northumberland* (third edition, 1805), it is stated that white clover, *being a true perennial*, was always sown in that county for permanent pasture, but that the cultivated red clover was only biennial. An instance is given, however, where seeds of native red clover were gathered from an old meadow and sown in a garden. The plants produced lived at least five or six years, and the writers suggested that such seed should be produced for sale, so as to get perennial plants. White clover had not then been so long under cultivation as red clover, and this probably explains why the white clover seed of commerce produced more lasting plants at that time than it does now.

The question arises as to how long the wild forms of white and red clover may be cultivated before they lose their hardy and perennial characters. Probably it would require a considerable number of generations to have any effect on these characters. If either of these clovers were sown by themselves under favourable conditions for producing seed, and if no seed were taken till at least the third year after sowing, the hardiness and perennial character of the plants should be safeguarded. A similar practice is followed in some parts of the West of Scotland so as to obtain more permanent seed of perennial rye-grass.

SUGGESTIONS FOR PIG-FEEDERS.

Pig-breeding in Great Britain is an industry of great importance, but it is one which has shown little tendency to develop. The number of pigs kept fluctuates from year to year, but, without actually decreasing, it has shown no permanent signs of growth during the past thirty years. There would seem, however, to be no reason why a considerable increase should not take place. The breeding and feeding of pigs offers a fair profit in most years, and the fact that this country pays huge sums annually for imported pig-meats suggests that a proportion of the demand might, with advantage, be supplied by the home producer. The fall in

the pig population of Great Britain during the past year or two, combined with the high prices which have lately prevailed, should certainly prove a stimulus to the pig-keeper to secure some of this trade and afterwards retain it in his own hands.

It will be seen from the table which follows that the pig population in 1909 was lower than either in 1907 or 1908.

—	1907	1908	1909
England	2,257,136	2,439,087	2,046,284
Wales	232,996	240,611	204,784
Scotland	146,634	143,784	129,819
Great Britain	2,636,766	2,823,482	2,380,887

The number of pigs in 1908 was 200,000 greater than in 1907, but also 440,000 (over 18 per cent.) greater than in 1909. It seems probable that breeding sows have been extensively marketed, for the number is lower this year than at any time since 1893, when it was 308,722, compared with 316,552 in 1909 and 369,476 in 1908.

The Trade and Navigation Returns for the ten months January to October show that the imports of bacon during the past three years have fallen off considerably, and the deficit is especially noticeable as regards the United States and Canada. The figures are as follows:—

IMPORTS OF BACON FOR THE TEN MONTHS ENDED
31ST OCTOBER.

From	Quantities (in thousands of cwt.)			Values (in thousands of £)		
	1907	1908	1909	1907	1908	1909
Denmark	1,511	1,726	1,530	4,545	4,783	4,849
United States of America	2,273	2,423	1,848	5,955	5,646	4,970
Canada	729	567	370	2,019	1,485	1,118
Other countries	78	76	136	221	209	427
Total	4,591	4,792	3,884	12,740	12,123	11,364

The shortage in the supply of pigs in the United States is therefore concurrent with the shortage in home supplies,

and this has tended to raise the price of pork, for the price of pigs in Great Britain is dependent on the total home and foreign supplies of pig-meat. The short life of the pig, however, enables the breeder to increase his stock very quickly, and times of scarcity are usually of short duration.

The price of fat pigs in the current year shows that the average price for the months of May, June, and July has, in all cases, been much higher than in the corresponding periods for 1908 and 1907.

AVERAGE PRICE OF FAT PIGS—MAY TO JULY.

—	Quality	England			Scotland		
		1907	1908	1909	1907	1908	1909
		per stone *	per stone *	per stone *	per stone *	per stone *	per stone *
Bacon Pigs	1st	6 8½	5 11	7 1½	6 4	6 0½	6 8½
	2nd	6 3½	5 5	6 7	5 6	5 3½	5 11½
Porkers	1st	7 0½	6 3½	7 5½	6 8½	6 3½	7 2½
	2nd	6 7½	5 9½	6 11½	5 11½	5 7	6 4½

* Estimated carcass weight

Prices in 1907, however, were higher than those in 1908, the former year being a medium between 1908 and 1909. The price of fat pigs has, in fact, fluctuated with the rise and fall of British and foreign supplies, the rise in the price of pigs in England since 1908 being something like 25 per cent.

The price of feeding stuffs has a very important bearing on the cost of production and the relative profit, and the table

AVERAGE PRICES OF OFFALS, MAIZE AND BARLEY MEAL FROM APRIL TO JUNE.

—	1907	1908	1909
	£ s d	£ s d	£ s d
Middlings (per ton)	6 5 2½	7 1 11½	7 12 7½
Pollards (per ton)	4 15 3½	5 0 5	5 0 6½
Bran (per ton)	4 12 0	4 18 5½	5 0 11½
Maize (per 480 lb)	s. d.	s. d.	s. d.
American	23 7½	28 0½	29 11½
Russian	23 7½	27 1½	29 5½
Barley meal (per 336 lb)	21 3½	20 8½	20 3

shows the average prices for the past three years, from April to June, for comparison with the prices of pigs.

From the above table it will be seen that during the period referred to the price of wheat offals had risen with the price of wheat; maize had also risen considerably in value; while barley meal remained steady. At the time of going to press, however, the price of wheat offals is lower than the prices prevailing in 1908 and 1907, while there is a slight fall in maize. The enhanced price of feeding-stuffs may afford one reason for a falling off in the supply of pigs, breeding and fattening being thereby discouraged.

From the foregoing statement of facts the general conclusion may be drawn that the prospects of profit from pig-feeding in the near future are very good. Much, however, depends on the manner in which feeding is conducted, and on the care with which the pigs are bred, housed and managed.*

Assuming that the dam is of good breed and otherwise suitable for the production of young pigs which will fatten rapidly and make high-class bacon, hams, and fresh pork, it may be said that the first necessity of sound feeding is to stimulate and sustain an abundant supply of milk from the time of farrowing until the young pigs are weaned. In proportion to their size, sows make as heavy a demand upon the ration, from the point of view of milk production, as milking cows, so that a sow which is suckling a litter of young must, to do justice both to herself and her offspring, receive a liberal allowance of good food. A ration composed of butter-milk or skim milk and middlings, with barley meal or maize meal, will be quite suitable for milch sows. A heavy milker among cows is liable to lose condition, and in the same way a sow with a large litter of young is likely to become thin, owing to the great demands of the growing family, however liberally she may be fed.

As regards the feeding of the young pigs the most important point is to keep them thriving steadily from birth: in their early days the feeding should ensure a strong frame

* The Board have already issued a leaflet (No. 100) giving general suggestions for pig-breeding and feeding, and this leaflet may be obtained free of charge by those interested, on application to the Secretary, Board of Agriculture and Fisheries, 4, Whitehall Place, S.W.

and muscular tissue, and for this purpose an adequate supply of nitrogenous food is required; later, the object of feeding is to cover the frame rapidly with meat and fat, when an abundance of fat-forming foods should be supplied.

In recent years a great deal of attention has been given to the question of pig-feeding in the United States and Denmark, and as the Board believe that the results of experience in those countries will be helpful to British pig-feeders, an account of some of the conclusions arrived at is given below.

Feeding Pigs before and immediately after Weaning.—Experiments* conducted with several litters of pigs showed that the sow and pigs together before weaning, and the pigs alone after weaning, required almost identical quantities of milk and meal for the production of 100 lb. net gain. The food-stuffs used were maize meal, middlings, oats, barley, and skim milk, weaning taking place when the young pigs were ten weeks old, and feeding being continued for a further seven weeks. The average of twelve litters showed that for 100 lb. gain the sow and pigs before weaning required 231 lb. of meal and 534 lb. of skim milk, while after weaning the young pigs (eight litters) needed 230 lb. of meal and 539 lb. of skim milk.

Henry showed at the Wisconsin Experiment Station that the weight at birth of a large number of young pigs averaged

WEIGHT AT BIRTH AND AVERAGE WEEKLY GAINS OF
YOUNG PIGS.

Before weaning : 10 weeks (Twelve litters, 86 pigs).			After weaning 7 weeks (Eight litters, 62 pigs)		
Week	Average weight.	Gain	Week.	Average weight	Gain.
	lb.	lb.		lb.	lb.
At Birth.	2'5	—	10	41'5	—
1	4'4	1'9	11	46'7	5'2
2	7'0	2'6	12	52'0	5'3
3	9'8	2'8	13	58'3	6'3
4	12'5	2'7	14	64'2	5'9
5	15'6	3'1	15	69'8	5'6
6	18'6	3'0	16	76'5	6'7
7	22'6	4'0	17	84'1	7'6
8	27'8	5'2			
9	33'1	5'3			
10	38'5	5'4			

2'5 lb., the heaviest pig weighing 3'6 lb., and the lightest 1'6 lb. By weighing the young pigs regularly for seventeen weeks it was found that they gained in weight on the average 1'9 lb. in the first week, 3'1 lb. in the fifth week, 4 lb. in the seventh, 5'4 lb. in the tenth, 5'9 lb. in the fourteenth, and 7'6 in the seventeenth week. The average gain for the last seven weeks amounted to 6 lb. per week per pig, and at the end of the seventeenth week the pigs were gaining over 1 lb. each per day. This will be clear from the table immediately above.

Food Consumed by Growing Pigs.—The average daily gain of pigs of different sizes, together with the food consumed per pig per day, and per 100 lb. live weight per day, and the average amount of food required to produce 100 lb. of gain, is shown in the following table* :—

Weight of pig.	Average weight of pigs.	Average food eaten per day.	Food eaten per 100 lb. live weight per day.	Average gain per day.	Food per 100 lb. gained.
lb.	lb.	lb.	lb.	lb.	lb.
15-50	38	2'23	5'95	0'76	293
50-100	78	3'35	4'32	0'83	400
100-150	128	4'79	3'75	1'10	437
150-200	174	5'91	3'43	1'24	482
200-250	226	6'57	2'91	1'33	498

These figures represent the result of a very large number of trials made at experiment stations in America, and may be accepted as authoritative. One pound of grain has been taken as equal to 6 lb. of skim milk or 12 lb. of whey, these being the equivalent values as found in practical tests made in Denmark. The figures show conclusively that whereas the larger animals make the greatest daily gains, the smaller pigs make the most economical gains, 293 lb. of food producing 100 lb. gain in the case of pigs averaging 38 lb., or less than 3 lb. of food per lb. of gain, while 437 lb. of food produce the same gain in pigs scaling 128 lb., or nearly 4½ lb. of food per lb. of gain, and, finally, it takes 498 lb. for the same result in pigs weighing 226 lb., or 5 lb. of food per lb. of gain.

The foregoing figures may be compared with those ob-

* Henry, *op. cit.*, p. 551.

tained in certain Danish experiments, in which the food requirements in grain or its equivalent to produce 100 lb. increase in pigs of various sizes were found to be as follows :—

Average weight of pigs. lb	Average food required for 100 lb gain. lb.
35-75	376
75-115	435
115-155	466
155-195	513
195-235	540

From these figures it is seen that a pig weighing 195-235 lb. requires nearly $5\frac{1}{2}$ lb. of food per lb. increase, while a pig scaling 75-115 lb. requires rather under $4\frac{1}{2}$ lb. for the same gain, a difference which it is well to bear in mind (see also table on p. 723).

In a test at the Wisconsin Station (*Bulletin No. 104*) two lots of six pigs were fed from birth for 32 weeks, and a record was kept of the total digestible food consumed. The complete results may be tabulated thus :—

—	Total digestible nutrients consumed	Total net gain	Nutrients per lb gain	Nutrient ratio
	lb.	lb	lb.	lb.
Lot A. Maize meal, 16 parts ; skim milk, 100 parts	3536·4	1251 4	2·83	1 : 4·54
Lot B Maize meal, 16 parts ; shorts, 24 parts	2214 3	927 2	2 38	1·5 38

Cost of Feeding Pigs.—On the basis of the average prices of feeding-stuffs and pigs quoted above, and the average daily gain from birth shown in the figures already given, we may approximately calculate the cost of pig-feeding. Before weaning 2·31 lb. of meal and 5·34 lb. of skim milk are consumed per 1 lb. gain (p. 722), and if we suppose this to continue for 10 weeks the weight will then be 38·5 lb. (p. 722), and the pig will have gained 36 lb. at a cost of 83·16 lb. of meal and 192·25 lb. of skim milk. The results will be practically the same even though weaning may take place earlier, as it usually does. At the end of 17 weeks the animal weighs 84 lb., a further gain of 45·5 lb., at a food cost of 104·65 lb. of meal and 245·25 lb. of skim

milk. At this stage the food requirement until the pig scales 160 lb. will probably average 4·5 lb. per 1 lb. increase (see tables, pp. 723-4), or, for the 76 lb. increase, a final charge in food of 342 lb. of meal or "meal equivalent." The total food cost is, therefore, 529·81 lb. of meal (or "meal equivalent") and 437·49 lb. of skim milk. Adding one-fifth to the meal in order not to under-estimate the cost, and taking the milk in round figures, we may place the figures at 630 lb. of meal and 450 lb. of skim milk. Assuming that the meal was composed, on the average, of equal parts of middlings, maize meal and barley meal, the cost for meal would be about £2, while at 1d. per gallon the skim milk would be worth say 3s. 9d., a total for food of £2 3s. 9d.—3·26d. per lb. live weight, or 4d. per lb. dead weight. If our 160 lb. pig be estimated as equal to a carcass of 128 lb. (80 per cent. of the live weight), and valued at a round sum of 7s. per 14 lb. stone, it would be worth £3 4s. This leaves a gross return of £1 os. 3d., against which must be placed the cost of marketing, rent and labour, probably reducing the figure to 15s. as the net profit on a pig of 160 lb. live weight, while the return in manure is not included.

It should here be pointed out that this estimate is only approximate; actual profits may be greater or less according to the foods used, the care and skill of the feeder in managing his stock, and the breed of pig. It is generally held that 5 lb. of meal are required to produce 1 lb. of gain, but the American and Danish figures quoted represent the results of a large number of trials with many hundreds of pigs, and they show conclusively that in the case of pigs under 160 lb. in weight, 1 lb. of gain is obtained at a less cost than 5 lb. of food, while if the animal is under 80 lb. much less food is required for such a gain. As an all-round figure 5 lb. is approximately correct, but in the marketing of smaller pigs a much lower figure might be adopted, and this would indicate a very fair profit at current prices. The financial result will naturally vary with market prices.

Feeding Stuffs for Pigs.—In order to arrive at an understanding as to what are the best rations for fattening pigs, it will be useful to give some idea of the feeding materials which are specially recommended in the United States and

Canada, *i.e.*, those which have been found to give the best returns per 100 lb. of meal or meal equivalent consumed by the pigs, and to discuss the relative effectiveness of the various feeding-stuffs.

Wheat.—Experiments in the United States have shown that while wheat is superior to maize, except as a finishing food, it is usually much more expensive than the latter, and, except in years of very low prices, is not much used. In Great Britain the disparity in prices is not so pronounced, but the late high price of wheat has precluded its use for pigs. Where employed it has been found useful to feed it with barley in the proportion of 2 lb. of wheat to 1 lb. of barley, giving also clover, lucerne or other green fodder. Weight for weight wheat is about equal to maize as a pig feed, but it produces more lean than maize. At the Oregon Experiment Station* it was concluded that a bushel of wheat properly fed to reasonably well-fed pigs should produce about 13'5 lb. of live pork.

Middlings.—This food-stuff is held to be of great value for pig fattening, and experiment showed it to be superior to maize, if fed alone, but a combination of maize and middlings gave 20 per cent. better results than middlings alone. For young pigs two parts by weight of middlings to one part of maize is recommended.

Bran.—Experiments at the Maine Agricultural Experiment Station (1889) showed that bran had but one-half the value of middlings. This food, also, can only be used in small quantities on account of its bulk. Its price is much above half that of middlings, and this clearly prohibits its use compared with middlings; it may, however, usefully be employed in small quantity.

Oats.—Most satisfactory results are obtained when the oats are crushed or ground. When ground and used in conjunction with maize they give excellent results, and one part of ground oats should be mixed with two parts by weight of maize meal. Henry's experiments showed that when oats were used in this way the feed requirements per 100 lb. gain were very low.

Barley Meal.—The value of barley meal for pig-feeding

* U.S. Dept. of Agric., *Expt. Stat. Record*, 1904-5, p. 85.

has long been established, but in the United States maize has been found superior to barley. On the other hand, Danish and British practice has placed barley meal in the front rank as a food for fattening and finishing-off pigs, especially for bacon. Canadian experimental work supports this view.* The best results are obtained from barley meal when fed in combination with pea meal or middlings, while it gives excellent results with roots or lucerne.

In the following experiments barley and maize are compared.† In the winter of 1906-7, at the North Dakota Experiment Station, twelve pigs about eight months old were divided into two lots of six and fed for 83 days on rations composed of (1) barley four parts and shorts one part, and (2) maize four parts and shorts one part. The results may be summarised as follows:—

	Average weight at beginning	Average weight at end.	Average total grain consumed	Average daily gain.	Average grain per 1 lb. gain.
	lb.	lb.	lb.	lb.	lb.
Lot No. 1 (barley) .	136·3	238·6	588·8	1·23	5·74
Lot No. 2 (maize) .	138·1	262·6	583·8	1·50	4·66

The average daily gain was, therefore, much greater in the case of the maize and shorts ration, while the consumption of food per lb. of gain was considerably less. This experiment was conducted with pigs of different breeds, and the individual gains showed great variation according to the breed, and emphasised the importance of raising a strain of pigs that are "thrifty and good doers."

The results of some further trials‡ are given in the table on the next page, and from the figures obtained it would appear that not only does barley produce greater daily gains than maize, but at a less cost per lb. of gain.

Maize.—An experiment at the Ohio State University showed that the cost of producing 100 lb. of gain from maize was 11s. 10d., while from wheat it was 16s. 8d. At the Illinois Experiment Station an average of 16 trials at various periods of the year, with pigs varying from 66 lb. to 311 lb.

* Bull. 51, Central Experimental Farm.

† North Dakota Agric. Expt. Stat., Bull. 84.

‡ U.S. Dept. of Agric., Bureau of Animal Industry (Bull. 47, p. 100).

in weight, showed that 5'34 lb. of whole maize were necessary to produce 1 lb. increase in live weight, the pigs gaining about 1'1 lb. per day, a bushel of 56 lb. hence producing a gain of 10 to 11 lb. live weight.

In ten years' experiments Henry found at Wisconsin* that there was an average saving of 6 per cent. due to grinding maize to meal for pig-feeding when used with middlings. This means that with maize at 25s. per quarter a saving of 1s. 6d. would be effected by grinding. At the same time pigs fed on meal make larger daily gains than those given whole maize, fattening, therefore, being more rapid.

BARLEY COMPARED WITH MAIZE.

—	Average daily gain.	Food per 100 lb gain.	
		Grain.	Milk.
Colorado	1b	1b	1b.
Whole maize	0'39	700	275
Whole barley	0'49	540	175
Maize meal	0'46	540	275
Ground barley	0'70	430	275
S Dakota			
Maize meal	1'53	453	—
Barley	1'59	457	—
Ont. Agric College			
Maize	0'70	547	—
Barley	1'17	456	—
Centr. Exp. Farm, Ottawa			
Whole maize	1'30	290	231
Whole barley	1'19	364	252
Ground maize	0'87	416	—
Ground barley	1'00	435	—

In general maize meal is more favoured than whole maize, but in comparing the two, Coburn states† that “when both the feed eaten and the gains made are taken into consideration, the profit in favour of corn (maize) meal is considerably less than many suppose.”

At the Missouri Experiment Station‡ it was found that valuing maize at 10s. per quarter, wheat middlings at £3 2s. 6d. a ton, wheat bran at £2 14s. a ton, oats at 6s. 8d. per quarter, and cost of grinding maize at 5d. per 100 lb., the cost of producing 100 lb. gain with various rations was

* Wisconsin Agric. Exp. Stat., Ann Rept., 1905-6, pp 26-32

† F. D Coburn, *Swine in America*, 1909, p. 273.

‡ Missouri Agric. Expt. Stat., Bull. 65.

as given in the following table. For the sake of comparison the estimated cost at the British prices quoted above is given in the second column.

—	Cost for 100 lb. gain		Estimated cost for 100 lb. gain at current British prices.†	
	s.	d.	s.	d.
1. Maize meal	14	8	43	7
2. Soaked whole maize	13	1	38	11
3. Whole maize	15	6	46	1
4. Maize meal, 4 parts; wheat middlings, 1 part	12	8	33	6
5. Maize meal, 2 parts; wheat middlings, 1 part	12	0	30	9
6. Maize meal, 4 parts; ground oats, 1 part	16	11	49	9
7. Maize meal, 2 parts; ground oats, 1 part	17	10	52	1
8. Maize meal, 4 parts; wheat bran, 1 part	13	1	30	6

† Maize, 29s. 9d. per quarter; middlings, £7 12s. 6d. per ton; bran, £5 per ton; oats, 18s. 6d. per quarter.

From this table it is seen that supposing the food-stuffs to be similar in quality to those utilised in the experiment, and fattening to take place at the same rate, mixtures 5 and 8 are the cheapest, costing 3'69d. and 3'66d. respectively per lb. of gain live weight. This figure, it may be observed, approximates to the estimate of Wallace for producing 1 lb. of pork, 5s. per stone of 14 lb., or 4'3d. per lb.—say 3'6d. per lb. live weight. (See also earlier estimate on p. 725).

At the Canadian Experimental Farm at Nappan, Nova Scotia,* experiments in pig-feeding were conducted comparing four rations composed of (1) 2 lb. maize meal, 1 lb. crushed oats, 5 lb. skim milk; (2) 2 lb. pea meal, 1 lb. crushed oats, 5 lb. skim milk; (3) 3 lb. shorts, 5 lb. skim milk; (4) 3 lb. buckwheat, 5 lb. skim milk. There were six pigs of mixed breeds in each lot and feeding continued for an average of 58 days. The results may be given thus:—

Lot.	Average weight at start.	Average weight at end.	Average net gain.	Average daily gain.	Average percentage of dressed weight.
	lb.	lb.	lb.	lb.	lb.
1.	74'8	163'3	88'5	1'54	78'7
2.	84'5	173'1	85'3	1'46	79'7
3.	82'3	169'1	87	1'49	79'2
4.	81'1	162'8	81'6	1'39	78'9

* Canadian Min. of Agric., Experimental Farms Reports, 1901, p. 366.

These results would appear to show that the four rations are approximately equal, the chief difference being between the maize meal and crushed oats ration and the buckwheat ration, a gain of about 7 lb. per pig in favour of the former. The rations were not compared as regards cost.

Peas.—Peas provide a most valuable food for pigs, especially when they are used with foods rich in carbohydrates. Numerous experiments have shown that there is a considerable difference between the carcass of a pig fed on pea meal and that of one which has been largely fed on maize. For example, at the Wisconsin Station pea meal and maize meal were compared,† and the pigs fed on the former gained 0·837 lb. per day, compared with 0·54 lb. in the case of those fed on maize meal. The average food eaten for 100 lb. of gain was 495 lb. in the case of pea meal and 606 lb. in the case of maize meal. The nutritive ratios of the two feeds were 1 : 3·18 and 1 : 9·75 respectively. As regards the slaughter test, it was found that the pea-fed pigs were constitutionally quite superior to the maize-fed lot, and in the former there was a better development of muscle or lean meat in proportion to fat, while in the latter there was a marked difference, the carcasses containing a greater proportion of fat, and being soft and flabby in consistency.

Rice Meal.—This by-product has, in America, according to Coburn, been found equal to maize meal. At the South Carolina Experiment Station, Berkshire pigs were fed on rice meal and maize meal, with skim milk in each case, and the best and most economical gains were made with the rice meal ration. Thus:—

—	Food required for 1 lb. gain	Average gain per head per day	Cost of 1 lb. gain
Rice meal, 1 part Skim milk, 4 parts	lb 2 48 } 9 91 }	lb. 1 72	d 1 92
Maize meal, 1 part Skim milk, 4 parts	2 57 } 10 28 }	1 66	2 31

The cost in Great Britain at current prices would, of course, be proportionately greater than this, but the figures serve to

† *Wis Exp Stat Rept*, 1902, p 17.

compare the effectiveness of the two meals. At the Massachusetts Experiment Station equal weights of the two meals fed to pigs of equal age, in conjunction with skim milk, yielded the same gain.

At the Hatch Experiment Station (Massachusetts)* an experiment indicated that good quality rice meal has a feeding value equal to a good quality maize meal. It was given in conjunction with skim milk:—

—	Average weight at beginning.	Average weight at end	Average daily gain.	Food per lb. increase live weight	
				Grain.	Milk.
	lb.	lb.	lb.	lb.	lb.
Rice meal	67	195·2	1·41	2·25	9·14
Maize meal.	65	193·5	1·42	2·25	9·13

In this case the choice between the two meals must depend on their purity and comparative market prices.

(To be continued.)

THE BRITISH CROPS OF 1909.

The preliminary statement of the produce of the corn, pulse and hay crops in Great Britain this year was issued on the 10th November, and the corresponding statement for the potato and root crops on the 24th November last. The average yield per acre for each of these crops, and also hops, with the excess (+) or deficiency (–) in 1909 in relation to the yield of last year, and to the average yield for the ten years 1899–1908, are shown in the first table on the next page.

The three cereal crops show substantially larger yields per acre than last season, and they are also considerably above the average of the ten-year period. The season has likewise been very favourable for the growth of potatoes and roots, although disease is reported to be more prevalent among the former than was the case last season. The pulse and hay crops have yielded less than the average.

The total production and yield per acre of the corn and

*Hatch Expt. Stat., Ninth Annual Report, p. 126.

pulse crops of the past two seasons are given in the second table below.

Over 800,000 quarters of the increase in the total production of wheat is accounted for by the extension of nearly

Crop.	Yield per acre in 1909	Difference from -	
		Yield in 1908.	Average yield of 1899-1908.
	bushels.	bushels.	bushels.
Wheat	33·76	+ 1·47	+ 2·30
Barley	36·63	+ 3·81	+ 3·54
Oats... ..	41·31	+ 1·54	+ 1·66
Beans	28·66	- 1·50	- 1·31
Peas... ..	25·89	- 2·32	- 1·46
	tons	tons.	tons.
Potatoes	6·39	- 0·58	+ 0·54
Turnips and swedes ..	16·16	+ 0·83	+ 2·67
Mangold	20·95	- 0·08	+ 1·33
	cwts.	cwts.	cwts.
Hay from clover, &c. .	28·85	- 2·57	0·88
Hay from permanent grass	22·75	- 2·36	- 1·05
Hops	6·59	- 5·51	- 2·74

200,000 acres in the area of land planted with the crop. The yield in England is over $2\frac{1}{4}$ bushels, in Wales nearly $1\frac{1}{2}$ bushels, and in Scotland $2\frac{3}{8}$ bushels per acre above the ten-year average, and in the last country only is the yield lower than in 1908, the difference there being just one-fifth of a bushel.

Crop.	Estimated Total Produce		Estimated yield per acre.		Average of the ten years 1899-1908
	1909	1908	1909.	1908.	
	quarters.	quarters.	bushels.	bushels.	bushels.
Wheat	7,694,858	6,566,892	33·76	32·29	31·46
Barley	7,620,962	6,840,055	36·63	32·82	33·09
Oats	15,397,308	15,453,404	41·31	39·77	39·65
Beans	1,117,180	1,105,442	28·66	30·16	29·97
Peas	550,117	544,533	25·89	28·21	27·35

The total production of barley is the highest recorded since 1902, and is 780,000 quarters above that of last season, although the area sown was practically the same. The yield per acre for Great Britain, which last season was under-average, is this year $3\frac{1}{2}$ bushels above the average, and

constitutes a record for this crop. In England the season's yield is also a record, being $4\frac{1}{2}$ bushels above that for 1908, and $3\frac{1}{2}$ bushels in excess of the decennial yield. In Wales and Scotland this season's result, although well above average, has been surpassed in some other years.

The oat crop has proved better than anticipated earlier in the season, and the total production is only 56,000 quarters lower than last year, in spite of a reduction of 127,000 acres in the area cropped. For the country as a whole the production per acre is $1\frac{1}{2}$ bushels better than in 1908, and $1\frac{3}{8}$ bushels above the decennial average. This result is due largely to the satisfactory returns in Scotland, where the total production is the most abundant obtained since 1894, and the yield the highest hitherto recorded, being $1\frac{1}{2}$ bushels higher than the good yield of last season, and $3\frac{1}{2}$ bushels above the average of 1899-1908. In England the result is about three-quarter bushel, and in Wales one bushel, above the average.

This has not been a good season for beans and peas, but the total production of each slightly exceeds that of last season owing to extensions in the areas under the crops. In England the yield of beans is $1\frac{1}{2}$ bushels, and of peas, $2\frac{1}{8}$ bushels per acre less than last year.

The estimated total production and yield per acre of the potato and root crops are as follows :—

Crop.	Estimated Total Produce		Estimated yield per acre		Average of the ten years 1899-1908.
	1909	1908.	1909	1908.	
	tons.	tons.	tons.	tons.	tons.
Potatoes ...	3,675,994	3,917,618	6 39	6 97	5'85
Turnips & swedes	25,132,497	23,768,235	16 16	15'33	13 49
Mangold... ..	9,565,523	8,995,267	20 95	21'03	19'62

The total production of potatoes shows a deficiency of 242,000 tons from the record crop of last season. In England the total crop is the largest recorded except in 1908, but the less satisfactory results are in Scotland. The total for Great Britain comes out below that of 1905 also. The yield per acre shows a fall of less than half-a-ton as compared with 1908 in England; in Scotland the deficiency exceeds one ton, but in Wales last season's result is repeated. Compared with the

ten-year average the yield for Great Britain shows an excess of over half-a-ton per acre.

The total production of turnips and swedes is 1,360,000 tons heavier than in 1908, and the largest since 1897. In England the crop yielded over 2,000,000 tons more than in the previous season, but Scotland has grown nearly 700,000 tons less. The yield per acre creates a new record for Great Britain, being three-quarters of a ton higher than in 1908 and $2\frac{3}{8}$ tons above the decennial average. A difference in the character of the past two seasons in England and Scotland is shown by this year's yield in the former, being nearly 2 tons higher than last year, and over 3 tons above the average, whereas in Scotland this year's yield is $1\frac{1}{2}$ tons lower than in 1908, although still largely above the average.

The total mangold crop of 1908 is the largest ever returned. The increase of 570,000 tons over 1908 is due wholly to the extension, by nearly 29,000 acres, of the area devoted to the crop. The average yield per acre in England is practically the same as last year, and $1\frac{1}{8}$ tons over the decennial yield. In Wales the result shows a little improvement over last season, but for the small acreage north of the Tweed the yield is just under the average, and nearly 4 tons per acre lower than in 1908.

The following table gives the total production and estimated yield per acre of hay and hops :—

Crop.	Estimated Total Produce.		Estimated yield per acre		Average of the ten years 1899-1908.
	1909.	1908.	1909.	1908.	
Hay from clover, &c. ...	tons. 2,936,177	tons. 3,506,784	cwts. 28·85	cwts. 31·42	cwts. 29·73
Hay from permanent grass .	5,432,360	6,213,355	22·75	25·11	23·80
Hops ...	cwts. 214,484	cwts. 470,761	6·59	12·10	9·33

Both rotation and permanent grasses have yielded a short crop of hay this season, and, in addition, the area mown was reduced by nearly 370,000 acres, so that the total production of 1909 was 1,350,000 tons less than in 1908.

In comparison with last season, rotation grasses have

yielded over $2\frac{1}{2}$ tons less to the acre, the deficiency being about 3 tons in England and Wales, and about half-a-ton in Scotland, but in the last country the crop of 1908 was also just under the average. Permanent grass gave about $2\frac{1}{2}$ tons per acre less than last season, and about 1 ton per acre less than the average for 1899-1908.

The total production of hops was less than half that of 1908, and the yield per acre about two-thirds of the ten-year average. This is partly due to the considerable reduction in the acreage, for the yield per acre has on several occasions been lower than in this season.

The soy bean, which has recently come into prominence in this country as a feeding stuff, is a native of south-eastern Asia and has long been cultivated in China and Japan. It has also been introduced into India but is not very extensively grown.

The Soy Bean.

Production in Northern China.—The beans which have been exported to the United Kingdom during the past year have come from Manchuria through the ports of Dalny, Vladivostock and Newchwang. There is no very precise information as to the area under cultivation within reach of the railways, but there is no doubt that the bean is largely grown and, given sufficient inducement, a considerable increase in the supply is likely to take place.

The total production of beans in Southern Manchuria, which is served by the ports of Dalny and Newchwang, is stated to have been 580,000 tons in 1907, and 830,000 tons in 1908, while in Northern Manchuria the Vice-Consul reports that the crop in 1908 probably amounted to 900,000 tons, and the prospects for the crop in 1909 indicate a yield larger possibly by twenty per cent.* The beans from Northern Manchuria come through Vladivostock. The spot prices in London on November 25th were reported to be about £7 10s. a ton for soy beans, and £6 12s. 6d. for soy bean cake. The continental demand is large.

Composition of Soy Beans. — Yellow, green and black beans are grown in China, and there are varieties of these, as

* F. O. Reports, Annual Series, No. 4372; *Board of Trade Journal*, August 12, 1909.

well as brown soy beans. According to a number of analyses they usually contain about 35 to 40 per cent. of albuminoids and 18 per cent., or less, of oil, but the composition varies according to their origin. The following are some recent analyses :

—	No. 1 Yellow	No. 2 Green.	No. 3 Black.	No. 4 Green.	No. 5 Yellow.	No. 6 Brown.	No. 7 Yellow.
	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.
Moisture ..	10'23	—	11'17	9'91	10'62	—	10'52
Ash	4'32	—	4'36	5'31	4'51	—	4'62
Oil	15'62	—	16'76	16'54	18'11	—	17'26
Albuminoids .	37'54	39'75	40'46	41'17	37'07	35'42	36'05
Carbohydrates	27'27	22'30	21'45	22'81	24'46	24'58	26'16
Woody fibre .	5'02	—	5'80	4'26	5'23	—	5'39

The analysis of sample No. 1 was made by Mr. S. H. Collins, M.Sc., lecturer in Agricultural Chemistry, Armstrong College, while samples 2 to 7 were analysed by Mr. E. S. Edie, M.A., B.Sc., Liverpool University. The first six were all Chinese beans, but No. 7 was grown in West Africa.*

On arrival in this country the oil is extracted from the beans by pressure, and the residue forms the soy bean cake or meal used for feeding cattle. The proportion of oil left in the cake varies, and its value for fattening purposes will, of course, vary according to its composition in this and other respects. Much of the cake sold is guaranteed to contain 6 per cent. of oil and 40 per cent. of albuminoids; decorticated cotton cake usually contains 8 to 10 per cent. of oil and 45 per cent. of albuminoids, while the undecorticated cake contains 5 to 6 per cent. of oil and 24 per cent. of albuminoids.

Bean cake is also exported from Manchuria, and as hand-presses are commonly used there, the proportion of oil remaining in the cake is higher. Analyses Nos. 1—3 in the following table are given by Mr. Acting Vice-Consul Gordon in a report to the Foreign Office (*Annual Series, No. 4372*), as representing results obtained from Manchurian bean cake, while the remainder represent soy bean cake made in this

* Bulletin No. 1, Liverpool Univ. Inst. of Comml. Research. Some analyses of beans grown in India and America are given in the *Bull. of the Imperial Institute*, vol. vii, No. 3, 1909.

country. Analysis No. 4 is by Mr. S. H. Collins; No. 5 by Professor Kinch, of the Royal Agricultural College, Cirencester, and No. 6 by Mr. James Hendrick.

—	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.
	per cent	per cent	per cent.	per cent.	per cent	per cent.
Water	17.38	15.90	19.19	13.31	13.0	11.3
Oil substance ..	9.76	9.70	9.18	6.00	7.0	8.1
Albuminous substances	40.98	41.67	45.00	44.37	42.5	44.9
Carbohydrate ...	20.73	20.64	15.62	25.04	37.5	23.7
Fibre, vegetable ...	6.65	6.64	6.23	3.90	5.0	5.2
Ash	4.50	4.45	4.78	7.38	5.0	6.8

Some of the cake and cake-meal which is being sold has had the oil extracted from it by means of a solvent, instead of by pressure. In such cases only $1\frac{1}{2}$ to $2\frac{1}{2}$ per cent. of oil remains.

Feeding Experiments with Soy Bean Cake.—Up to the present very few experiments on systematic lines have been made with this cake, though it has been extensively used for feeding purposes by farmers.

One experiment, reported by Professor Gilchrist, of Armstrong College, was carried out at the Cumberland and Westmorland Farm School*, and was intended to test the comparative feeding value of soy bean cake and decorticated cotton cake. Three cows and three heifers, after their first calf, were selected in February, 1909. They were all at an early stage of their lactation period, and as the milk naturally declined in quantity as the trial progressed, it was decided to feed soy bean cake during the first and last three weeks and decorticated cotton cake during the middle six weeks. Each cow received daily 49 lb. swedes or 42 lb. mangolds, 14 lb. hay, 7 lb. oat straw, 4 lb. crushed oats, and 4 lb. soy bean cake or 4 lb. decorticated cotton cake.

As regards milk production, there was a slight advantage in favour of the soy bean cake, but it was so small that the two cakes were considered to be equal in this respect. Both foods also gave similar results as regards the fat content of the milk. The cows gained rather more in weight while they

* Trials of Soya cake for Milch Cows, Armstrong College, 1909.

were receiving the soy bean cake than they did on the decorticated cotton cake.

An experiment on similar lines was conducted at the Royal Agricultural College, Cirencester.* Six cows were selected from the College herd, and divided into two lots of three each, care being taken that the age, period of lactation, and quantities of milk per day were as nearly equal as possible. The cows were turned out to grass on April 5th, and the experiment lasted from April 12th to May 9th. The daily rations were 35 lb. pulped mangolds, 6—8 lb. chaff, 2 lb. ground oats, 1 lb. bran, and a small allowance of hay. Lot I. received, in addition, 4 lb. soy bean cake, and Lot II. 4 lb. decorticated cotton cake; the bean cake contained 6 per cent. of oil and 40 per cent. of albuminoids and cost £6 10s. per ton, while the cotton cake contained 8 per cent. of oil and 34 per cent. of albuminoids, and cost £7 10s. per ton.

The yield of milk appeared to be little affected by the kind of cake used. The percentage of butter-fat in the case of the bean cake remained almost constant, a slight increase, if anything, being noticed; with the decorticated cotton cake the percentage of butter-fat had a tendency to fall.

The butter produced by the bean cake was of a soft, oily nature and quickly churned, but it yielded well. It was, however, of a decidedly paler colour and somewhat inferior flavour as compared with that from cotton cake. The butter produced by the decorticated cotton cake was hard, and took a longer time to churn. The yield, however, was not so good as from the bean cake. No difference in laxative effect or otherwise was observed in the two cakes.

Another experiment on a small scale was carried out at the Harper Adams Agricultural College, with two rather delicate heifers, to test the question of the possibility of this cake having any detrimental effect on animals. Increasing quantities up to 7 lb. a day were given to one animal without any ill effects and the cake was eaten with relish. The other heifer was fed on a patent cake, and then a sudden change made to soy bean cake, and in this case also no difference was observed.

An experiment carried out in Germany, at the Agricultural Institute at Bonn, is reported in the *Deutsche Landwirtschaftliche Presse* (22nd and 26th May, 1909), in which soy bean cake was compared with linseed cake for feeding cows. The experiment was of a very exhaustive character, but only included three cows, which were fed for a fortnight at a time on linseed cake, soy bean cake, and again on linseed cake. The results showed little difference as the result of the feeding, and the conclusion arrived at was that soy bean cake was a quite satisfactory food for cows.

Use of Soy Bean Cake for Feeding. — The foregoing experiments, and the analyses which have been made, show that this cake may be regarded as a useful feeding stuff when given to stock in suitable quantities and in combination with other foods. It is, however, rich in albuminoids, and if not fed judiciously may give rise to digestive troubles. As the analyses given above show, it approaches decorticated cotton cake in composition, and should be fed in the same way as that cake with roots, hay and straw.

Several cases have been reported to the Board in which stock fed on soy beans or cake have become ill and died, and an investigation into these cases is now in progress. At present there is no evidence to show that cake made from pure soy beans (*Glycine hispida*), or the beans themselves, if fed to animals in suitable quantities, would cause undesirable results. It is possible that the accidents reported have been due to an admixture with the soy beans of some other feeding material, possessing poisonous properties.

Soy beans have been cultivated for a number of years in the United States and are regarded as a useful fodder crop. The plant is grown, not only for the beans, but also for hay, while it is, perhaps, more commonly used for green forage. Some information as to their cultivation was given in this *Journal*, May, 1909, p. 128, and further information on this point will be found in *Farmers' Bulletin*, No. 372, of the United States Department of Agriculture.

A method of growing corn has recently been advocated in Russia which, although it is not likely to be suitable in cultivating large areas in this country,

A Russian Method of Corn Cultivation. might prove useful in growing corn for seed or other special purposes. It has also been suggested that it might be

adopted by small holders, as it would enable them to grow a heavier and better crop on a small area.

The method, which, broadly speaking, depends on the careful cultivation of each individual plant, is not new, as it has often been proposed in the past in this country, and constitutes the ordinary practice in China at the present day. The large amount of labour required makes it inapplicable for ordinary corn growing except in countries where labour is very cheap and very plentiful.

The author of the system (M. Demtschinsky) states that farming in Russia is giving more and more unsatisfactory results, and in consequence famines, formerly of rare occurrence, have become common. The number of live-stock in the country is not enough to provide sufficient manure, while the introduction of a rotation of crops apparently presents great difficulties, so that it is necessary to find some other means of increasing the low average yield of corn.

For this purpose he suggests the practice of earthing-up, or alternatively that of deep-setting or transplanting—the object in any case being to develop root-action and increase the tillering power, so that a greater return is obtained.

In the case of earthing-up, the land would be prepared in the usual way, and the sowing done by a hand or horse drill, a little artificial manure being applied, if possible, at the same time. The drill should be arranged so as to sow three rows $3\frac{1}{2}$ – $4\frac{1}{2}$ inches apart, leaving a distance of $10\frac{1}{2}$ –14 inches between each third row to give room for working. The greater distance is necessary when a horse hoe is to be employed.

About a month after sowing, when the young plant has appeared and begins to send out shoots, the first earthing-up should be done. This stage is a critical one in the life of the plant, and by heaping up the earth round it the plant is protected from drought, frost, and other unfavourable influ-

ences, the tillering shoots multiply and the roots develop to a very much greater extent than they otherwise would.

The process of earthing-up may be carried out with a machine like a small hand hoe or cultivator, the tines of which are arranged so as to throw the earth between the rows over the plants on each side, while the outside tines cover the outside of the rows. A simple instrument suitable for working three rows at a time may be made something like a large rake by fixing four suitable blades at the proper distances on a beam or head which is fitted with a handle and can be pulled steadily along the rows. This presses up the earth round the plants, and also serves to eradicate weeds. A week or ten days afterwards, if the plants can be seen to have grown, the process can be repeated. A final earthing-up is recommended some months later in the case of winter crops.

A number of experiments have been conducted in Russia, and the results obtained in two cases are given in M. Demtschinsky's pamphlet.

One experiment with oats was carried out in the province of Kursk on a plot 163 square yards in extent. The sowing was done by a hand-drill on the 5th April, the first earthing-up on the 7th and 8th May, and the second about June 10th.

The plants were covered to a depth of $1\frac{3}{4}$ inches at each operation, and on the 20th July the ground was hoed for weeds. In the middle of May the oats were about 12 inches high, flowers appeared at the beginning of June, and as early as the end of the month the ears began to appear. The crop was reaped by the end of July; a yield of $190\frac{1}{2}$ lb. was obtained from 163 square yards.

This, as M. Demtschinsky points out, is equivalent to 145 bushels per acre (39 lb. to the bushel), but no accurate conclusions can be drawn from so small an area.

An experiment on a larger scale in the province of Kursk is also mentioned. Here barley was grown and a crop of 47 bushels per acre (50 lb. to the bushel) was obtained by earthing-up, as against $33\frac{1}{2}$ bushels by ordinary cultivation. The expenditure is stated to have been practically the same in both cases.

The second method which is advocated is that of transplanting and deep-setting. The seed can be sown either

broadcast or in rows at a distance of $1\frac{3}{4}$ inches apart and $1\frac{1}{2}$ inches apart in the row. The latter method is the better, as the plants are more even in size.

The transplanting is done in the same way as with young cabbages. It is recommended that the earth should be shaken from the roots, and the plants placed upright in a shallow box, the bottom of which is covered with basic slag. When the box is full it can be taken to the field and the planting done in rows, allowing 7 inches between the rows and 7 inches between each plant. The plants should be put in deeply, about three-quarters of an inch lower than before, so as to cover the base of the leaves. If the weather be dry the plants may be watered with weak liquid manure.

Another method of deep-setting without transplanting may be adopted if the seed is sown in rows at even distances apart. The work is done with two dibbles, one of which is hollowed at the end like a scoop. When the plants are of suitable size, the dibble with the scoop-like end is inserted under the roots of the plant so as to raise it slightly, while at the same time an ordinary dibble is inserted on the other side of the plant to the required depth. The result is that the plant sinks lower in the soil and the loose earth can be heaped up round it.

A number of trials have been made in Germany for the purpose of testing the method. One of the most exhaustive, which was carried out at the Agricultural Institute at Bromberg, is reported in the *Mitteilungen der Deutschen Land.-Gesellschaft* (9th October, 1909). Duplicate plots were arranged with both rye and barley. The rye plots were arranged as follows: (a) drilled in rows 6 inches apart in the ordinary way; (b) planted in rows 10 cm. (nearly 4 inches) between the rows and 20 cm. (nearly 8 inches) between the plants; (c) drilled in sets of three rows 10 cm. apart, with a distance of 30 cm. (nearly 12 inches) between each three rows; (d) drilled as in the case of (c), but the plants afterwards thinned to 8 inches apart as in (b).

In the case of the rye, the sowing of (a), (c) and (d) took place on 22nd September, and for (b) on the 3rd September, the plants being transplanted on the 24th. The latter suffered from drought and did not recover till the beginning of

October. On the 14th October the (d) plots were thinned, and on the 17th both (c) and (d) were earthed-up. The winter was severe and only about forty per cent. of the transplanted seed (b) survived, whereas (c) and (d) suffered but little. The development of the roots and shoots on (b) was, however, much better than on any of the other plots, and when the crop was reaped the number of stalks per plant on (b) averaged 10, as against 4 on (a), 7 on (c), and 8 on (d). The number of full ears per plant and the number of grains in the ear were also greater than on the other plots. The average results are given in the following table :—

	Rye.		Barley	
	Grain, bushels (60lb.) per acre	Straw, cwt. per acre	Grain, bushels (50lb.) per acre	Straw, cwt. per acre.
a. Ordinary cultivation	49·6	34·6	56·3	27·6
b. Transplanted	32·1	22·7	6·6	10·7
c. Earthed up	52·4	34·2	70·5	35·5
d. Thinned out and earthed-up ...	35·2	25·8	56·4	28·5

It will be seen that the transplanted rye gave the smallest yield, which was attributable to the wide planting in the first instance, and was further reduced by the thinning-out caused by the unfavourable winter. The same reason accounts for the poor yield on (d). The yield, however, of the earthed-up plants on plot (c) differs very little from plot (a) and could not be regarded as remunerative.

In the case of barley, the arrangement of the plots was the same, but the distance between the plants and rows was somewhat different. In plot (a) the rows were 12·5 cm. (nearly 5 inches) apart; in plot (b) the transplanting was done in four rows 7 cm. ($2\frac{3}{4}$ inches) apart; with an interval of 30 cm. (nearly 12 inches) between each set of four rows, the plants being 10 cm. (nearly 4 inches) apart; in plot (c) five rows were drilled about 8 inches apart with an interval of 12 inches between each set of five rows; on plot (d) the rows were drilled in the same way, and the plants were thinned out to 4 inches apart.

Sowing was done on 8th April, transplanting on the 4th May, thinning-out and earthing-up on the 11th May. The transplanted seedlings suffered very much from unusual

drought in May, and only a small proportion survived. The crop on plots (c) and (d) grew somewhat more slowly than that on plot (a), but a thoroughly good stand was secured. The tillering was greatest on plot (d), where the plants were thinned-out and earthed-up, an average of 12 stalks per plant with 10 full ears being obtained, while plot (c), which was earthed-up, gave 10 stalks per plant with 9 full ears.

The results as regards yield are included in the table above. As has been stated, plot (b) was a failure, and Herr Kruger in reporting on the experiments observes that in his opinion the transplantation of spring-sown cereals would only be successful in exceptional cases in Germany, where the weather in May and June is usually dry.

Owing to the distance of the plants apart on plot (d) the yield, though excellent individually, was only equal for the whole area to that obtained on plot (a) by ordinary cultivation. On plot (c), however, where the rows were earthed-up, a high yield was obtained, which exceeded the yield on plot (a) by 14 bushels of grain and nearly 8 cwt. of straw, a return which would amply justify the extra labour involved.

A report has recently been issued by the Colonial Office [Colonial Reports, Misc.; No. 61. Cd. 4909. Price 2d.] on

**Agriculture in
South Africa.**

Agriculture and Viticulture in South Africa. This report was prepared by Lord Blyth, and is based on observations made during a visit to South Africa in the early part of this year.

Lord Blyth refers to the rapid development which has characterised agriculture in South Africa in the seven years since peace was proclaimed, a development attributable in a large measure to the financial support of the Government, and also to some extent to the generosity of private individuals. This support has taken the form, not only of direct encouragement and assistance to individual industries, but also largely of spreading education and scientific knowledge.

Colleges and Experimental Stations.—The agricultural colleges and experimental stations of South Africa are features of great importance. Not only in or adjacent to the four capitals, Cape Town, Bloemfontein, Pretoria, and Pieter-

maritzburg, but also in or near several of the other large towns of the four Colonies, there have been established colleges, farming and horticultural stations, stud farms, and veterinary centres for bacteriological and other investigations. They appear to have enlisted all the best and most up-to-date scientific knowledge of the age for the use of the farmer, the breeder, and the public generally.

The benefits from these institutions are becoming everywhere apparent, and, while every step is being taken to combat and exterminate the numerous diseases that affect vegetation in South Africa, every method also appears to be adopted in order to discover which plants are most suited to the diverse soils and climate of each Colony or district.

Agricultural Shows.—The agricultural shows also afford great educational opportunities for all who are interested in agriculture. In order to inform and instruct the cultivators of the land, the Governments have instituted a system of exhibiting at all the agricultural shows those seeds and plants best adapted to the different soils, as well as various suitable breeds of poultry. Approved seeds, plants, and eggs are sold to the farmers at nominal prices, while sires of many of the noted breeds of horses and cattle are, in many parts of the country, placed at a convenient distance for the use of agriculturists. Specimens of the best breeds and cross-breeds of sheep are also kept, in order to show what varieties are most suitable for the production of wool and meat.

Imperial Intercommunication and Trade in Agricultural Produce.—Among other points, Lord Blyth draws attention to the fact that a greater knowledge of Colonial conditions would not only be of direct service to British agriculturists, but would also tend to develop the trade in agricultural produce. "I cannot help feeling," he says, "that circumstances demand a closer touch and more constant sympathetic intercommunication between the Board of Agriculture at home and the Government Departments of Agriculture in South Africa, as well as of all the Colonies and Dependencies of the British Empire. I think that we of the Mother Country have something to learn from the Colonies, as the Colonies have to learn from us. By means of more frequent intercourse, not only should we acquire a great deal of useful information as to the suitability of seeds and plants for the different soils and

climates of the Empire, but we should be in a better position to encourage a large interchange of products of the soil of all parts of His Majesty's dominions.

"At the same time, through ignorance of the wants of the people of our Colonies, there is being lost to the Mother Country much trade which goes to merchants in foreign countries, entirely owing to their greater enterprise in acquiring a knowledge of the Colonial requirements, both as to the goods themselves and the packing, which, in the case of plants, seeds, fresh and preserved fruit, and eggs, has become quite a fine art with some of the Continental nations."

Packing of Goods.—As an example bearing on the question of packing, it is mentioned that while there is great confidence in English seeds, yet in many instances the orders for plants and trees go to France or other parts of the Continent of Europe, because it is believed that the details of packing this class of goods will receive more careful attention than in England.

Pedigree Live Stock.—In South Africa, as in our other Colonies, there is a considerable, and, it is believed, a growing market for pedigree live stock. The results of the breeding enterprises at the Government farms in the four Colonies have been so highly appreciated that the stock distributed from these centres is doing important pioneer work in opening up fresh territory for pure-bred cattle, sheep, and pigs. The desirability of nursing this profitable demand for British stock is obvious. It is natural to expect that this country should be looked to mainly to supply the animals requisite for the grading up of the studs, herds, and flocks of the African Colonies, but everything possible should be done to attract representative stock-owners to Great Britain.

With the object of encouraging and facilitating commercial intercourse between the Mother Country and the Colonies, Lord Blyth suggests that agricultural and breed societies at home should make visitors from our dominions abroad, who are leading officials—such as managers, secretaries, and superintendents of Colonial societies—honorary members, not only for the time of their visit to England, but also during their term of office, for by this means our visitors would be brought directly into touch with the breeders in the United Kingdom of the classes of animals needed in the Colonies.

Such a proceeding would be an acceptable act of courtesy to our friends from our rising possessions abroad, and, at the same time, be instrumental in promoting and retaining trade within the Empire.

Sea Freights for Cattle.—A formidable barrier to the extension of trade between the United Kingdom and the British Colonies, particularly as regards the exchange of live stock, is the almost prohibitive price charged for the conveyance of cattle from England. For instance, animals at the present time are carried from Canada to the Cape, or Australia to the Cape, for something like one-third, or even one-fourth, of the charge for transport of the same class of animal from Great Britain to South Africa. This must mean an annual loss of a large amount of business for British stock breeders, for in some instances the cost of the animal is doubled by the excessive charge for freight.

The report contains, in addition to the above extracts, much interesting information as to the conditions and prospects of agriculture in South Africa, and also includes a letter addressed by Lord Blyth to the Hon. J. X. Merriman, Premier of Cape Colony, on the prospects of the Cape wine industry.

Representations were recently made to the Board of Agriculture and Fisheries to the effect that a considerable diminution was taking place in the

**Prevalence of the
Lapwing or Plover.**

number of lapwings in Great Britain, and in view of the utility of this bird to agriculture, the Board have caused an inquiry to be made into the subject through their honorary correspondents.

The Lapwing, Green Plover, or Peewit is a familiar bird in most parts of Great Britain. It breeds in marshes, moors, and meadows, and is seen in large flocks in the autumn and winter. It is one of the most useful of British birds, as it devours snails, wireworms, beetles, and the larvæ of various insects that infest crops, but, unlike most other wild birds, its increase is much restricted by the demand for its eggs, which fetch a good price at certain times of the year.

The evidence which the Board were able to obtain

shows, however, that the Lapwing is still common in most parts of Great Britain, but 75 out of 177 observers, or 42·3 per cent., observed a decrease. Out of 177 replies from practically all counties, 129 declared the bird to be common, while thirty-four considered it uncommon, or not very plentiful in their districts.

The question whether there had been an increase or a decrease in their numbers naturally admitted of considerable difference of opinion, but there was evidence that the numbers were decreasing in many districts. The replies may be classified as follows :

	England.	Wales.	Scotland.
Increase observed	12	1	5
Decrease observed . . .	47	4	24
No decrease observed . .	43	7	26
Indefinite	7	—	1

As regards the evidence of an increase, the changes in this direction appear to be strictly local. In a number of cases a decrease was reported from districts not very far removed from those in which an increase was stated to have occurred, so that although increases have no doubt occurred here and there, there is nothing to suggest any general extension in the number of lapwings.

The position as regards the reported diminution is not so simple, for, as will be seen, the numbers of those who have and who have not observed a decrease are about equal. Less weight is perhaps to be attached to the figures showing "no decrease," as the replies are in many instances less definite than those of persons who take the opposite view.

Taking the group of Eastern Counties from Essex to the East Riding of Yorkshire, included in Division I. of the Agricultural Returns, the replies do not indicate any general decrease. Five persons record an increase, seven a decrease, while eleven have not observed any change. One correspondent remarks that the practice of shooting wild birds is more common than formerly in the Thames Estuary, and this has a tendency to drive the birds to less frequented districts.

In the Southern and Midland Counties, included in Division II., a decrease is more generally recorded, as four persons report an increase, fourteen a decrease, and seven "no change." One writer, however, observes : "I am pretty

well acquainted with the Lapwing over the Southern Counties of England, and I do not think that the bird has decreased in numbers; of the two I should say it has increased." Several correspondents, on the other hand, refer to a decrease in Sussex and also in the Isle of Wight.

As regards the Western and West Midland Counties, from Wilts to Cornwall and up to Salop, the evidence of any general decrease is indefinite. One correspondent reports an increase, fourteen a decrease, while thirteen consider there has been no decrease.

In the Northern Counties opinion is nearly equally divided, but in Wales the majority consider there has been no decrease. In Scotland also the balance of opinion is against a decrease, as five persons report an increase and twenty-six no decrease, while only twenty-four have observed a diminution.

The reports received all referred to different districts, and are not, therefore, to be regarded as contradictory; but they cannot be said to show any very marked diminution in the numbers of this bird. Even in those parts where a decrease has been observed it seems to be still fairly common.

Practically only one cause for its decrease is given, and that is the practice of egg-collecting. This is referred to more or less emphatically as an evil by a number of correspondents, many of whom say that egg-collecting is on the increase, and urge that the eggs should be protected under the Wild Birds Protection Act.

The trapping of these birds by bird-catchers seems to be quite unknown, and the interference with the natural increase in this country, apart from casual shooting, appears to be confined to the destruction of their eggs.

One of the most recent additions to the list of institutions providing instruction in agriculture is the University of Oxford, which, in 1907, definitely recognised Agriculture or Rural Economy as a subject of study within the University.

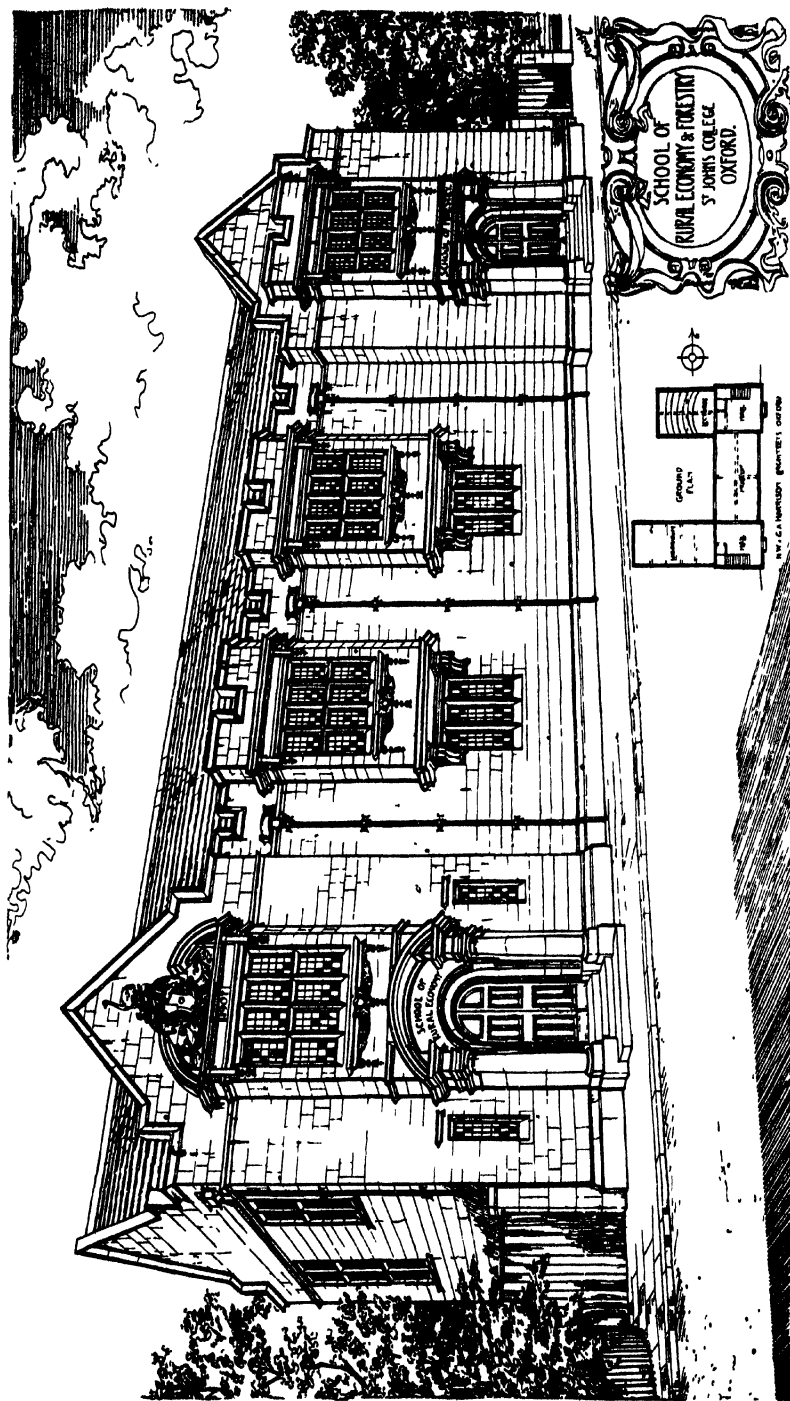
**Instruction in
Agriculture at the
University of Oxford.**

Agricultural education had, indeed, received some recognition in the University more than a cen-

tury before, when, in 1796, Dr. Sibthorp, then Professor of Botany at Oxford, bequeathed land worth about £200 a year for the endowment of a Chair of Rural Economy. The Sibthorpiian Professorship, as it was called, was, however, practically amalgamated with the Professorship of Botany, and from 1796 to 1884 it was never held independently. In the latter year Sir Henry Gilbert was appointed to the Sibthorpiian Professorship, and held the post for two periods of three years each, during which he gave lectures chiefly on the results obtained experimentally at Rothamsted. During the agricultural depression which occurred after 1878 the income from the endowment fell to about £120 a year, and this was absorbed during 1891-4 in the maintenance of farm buildings and expenditure on improvements on the estate. After an interval of three years, Professor Warington was appointed in 1894, and held the post until 1900. On his resignation no further appointment was made, owing to the reconstitution of the Professorship being under discussion.

For some years prior to this, proposals for including agricultural science in the curriculum of the University had been made, but, although they obtained considerable support, no definite action was taken until 1905, when, on the abolition of the Royal Engineering College at Cooper's Hill, Oxford was charged with the education of the selected probationers for the Indian Forest Service. In order to provide for the instruction of these probationers, the University agreed to reconstitute the Sibthorpiian Professorship. The College of St. John's came forward and augmented the stipend of the professor by £600 a year, and subsequently associated the professorship with a fellowship in that College, and also undertook the erection of a laboratory with the necessary class-room accommodation, the cost of which has been approximately £10,000.

The duties of the Sibthorpiian Professor, as amended by Statute in 1905, are defined to be the giving of lectures and instruction on the scientific principles of agriculture and forestry, including the pathology of plants. Dr. W. Somerville was appointed to the Professorship in 1906. Shortly afterwards the Hebdomadal Council instituted a Committee for the organisation of the study of Rural Economy, and also established a Diploma in the subject.



SCHOOL OF RURAL ECONOMY. OXFORD.

At the present time the Diploma in Agriculture and Rural Economy is granted to candidates who have pursued a course of study approved by the Committee, and have passed certain examinations. Before admission to the course, candidates must satisfy the Committee that they have received a good general education.

The course of study must extend over two academical years and must be pursued at Oxford; but members of the University who have kept by residence all the terms required for the Degree of Bachelor of Arts may be permitted by the Committee to pursue it elsewhere. The course of study comprises the following subjects: Principles of agriculture, elements of chemistry, elements of botany, rural economy, agricultural chemistry, agricultural zoology, surveying, and at least one of the three subjects—the elements of economics, the elements of forestry, the elements of geology.

The examination for the diploma is held annually about July 1st. It includes written work, practical work, and a *viva voce* examination. Every candidate must (1) have been admitted as a student for diploma; (2) have satisfied the examiners in the preliminary examination in the Honour School of Natural Science in chemistry (or in some other examination accepted by the Committee as equivalent); (3) have satisfied the examiners in the Pass School in the elements of rural economy; (4) have satisfied the committee that he possesses a sufficient knowledge of surveying; and (5) present certificates showing that he has attended approved courses of instruction in the subjects which he offers.

The subjects of examination for the diploma are:—elements of botany, rural economy, agricultural chemistry, agricultural zoology, together with at least one of the following subjects: elements of economics, elements of forestry, elements of geology.

Candidates may offer the subjects of the diploma at separate examinations, and may offer more than one subject at the same examination.

Candidates who have obtained honours in botany or in geology in the Final Honour School of Natural Science will be exempted from the diploma examinations in botany and geology respectively; also candidates who have satisfied the examiners for the diploma in forestry in subjects auxiliary to

forestry will be exempted from both, and candidates who have obtained the diploma in economics or the diploma in forestry will be exempted from the diploma examination in those subjects.

In addition to granting the diploma in agriculture, the University also recognises rural economy as a subject for the ordinary B.A. degree. The scope of the subject for this purpose is the same as that included under principles of agriculture in the diploma course.

SUMMARY OF AGRICULTURAL EXPERIMENTS.

MILK, BUTTER, AND CHEESE.

Milk Records.—(*Edinburgh and E. of Scotland Coll. of Agric., Bull. XV.*)—An experimental inquiry into the yield and composition of the milk of the dairy herd at the County Asylum, Rosslynlee, was commenced in 1905, and reports on the subject appeared in the JOURNAL, July, 1907 (p. 205), and March, 1909 (p. 953).

The scope of the investigation is to determine the daily yield of milk of each cow, to ascertain the quality of the milk by weekly analyses, and to use the information so obtained as a guide to the improvement of the herd by selection and breeding. The latter is naturally a slow process, but even in three years an improvement seems to have taken place.

The influence of the hours of milking on the composition of the morning and evening milk has been very noticeable. In 1905, the intervals between the hours of milking were 9½ and 14½ hours respectively. The morning milk was much poorer in fat than the evening milk, the difference in average percentage being no less than '65. In the following year some improvement in the hours was effected, and the difference in the percentage was reduced from 65 to '49. A further improvement was made in 1907-8, the hours of milking being 5 a.m. and 4 p.m., giving intervals of eleven and thirteen hours respectively, with the result that the difference between the percentage of fat in the morning and evening milk has now been reduced to '22.

The great difference between cows as milk producers is very clearly brought out in this investigation. Of eighteen cows that were in the herd for the whole year, the heaviest milker gave 1,224 gallons, worth, at 6½d. per gallon, £34 8s., while the poorest cow yielded only 438 gallons worth £12 6s. The average yield of the eighteen cows was 860 gallons, containing 3'56 per cent. of fat in the morning milk and 3'78 per cent. in the evening milk.

Effect of Brewers' Grains on Milk.—(*Durham C.C., Education Com., Offerton Bull., No. 3.*)—Experiments to test the effect of brewers' grains on the quantity and quality of milk were carried out on behalf of the Durham C.C. at Offerton Hall in 1905-6, and were reported in this JOURNAL, May, 1907 (p. 87). The experiments were continued in 1907-8, ten cows being selected and divided into two lots of five each. They were fed on a ration of 4 lb. maize meal, 2 lb. Bombay cottoncake, 3 lb.

chopped straw, and 12 lb. hay; Lot I. received in addition 20 lb. of brewers' grains and 20 lb. swedes, while Lot II. received 60 lb. swedes. Feeding in this way was continued for ten weeks, when the rations were reversed—that is, Lot I. received the increased quantity of swedes and Lot II. the brewers' grains. The variations in the results were not great, but the two series of experiments are considered to point to the following conclusions:—

(1) A moderate allowance of 20 lb. of brewers' grains per day has the effect of increasing, at all events for a certain period, the daily yield of milk. The period over which such increase is maintained has its limit, and the practice of changing the diet is a good one.

(2) The effect of brewers' grains on the yield is not confined to the earlier period of lactation, and it is probable that by a judicious use of brewers' grains the lactation period might be considerably extended.

(3) The evidence of the experiments with regard to the percentage of fat in the milk seems conclusive that, so far as the daily average of fat is concerned, brewers' grains in moderate quantities produce in the long run no appreciable diminution of fat, although the percentage of butter fat in the morning's milk seems to be lowered more frequently. Having regard to this fact and the 3-per-cent. standard brewers' grains are not to be recommended where the mixed milk of a herd of cows is habitually low in the morning. It must also be borne in mind that the above conclusions are based on results obtained by feeding brewers' grains in moderate quantities only and with a good complement of artificial foodstuffs.

In these experiments no effect was produced by the brewers' grains on the non-fatty solids, nor was the effect on the live-weight of the cattle very marked.

Transfer of Boric Acid from Food to Milk.—(Durham C.C., *Education Com., Offerton Bull.*, No. 3).—Indian cottoncake is frequently treated with boric acid as a preservative, and experiments have been carried out by Mr. S. H. Collins, Lecturer in Agricultural Chemistry, Armstrong College, to determine whether the milk of cows fed on cake thus preserved would be likely to contain boric acid.

Two cows were fed on 5 lb. maize meal and 3 lb. decorticated cottoncake, with straw chaff, and hay, while two other cows were fed in a similar way, except that they received a small quantity of "boric meal" made from 19 parts of maize meal and 1 part of boric acid. Boric acid appeared in the milk at once, the maximum being 50 parts per million—a small amount, but sufficient to render the seller liable to prosecution under the Food and Drugs Acts. The amount of boric acid given was by no means excessive, as it was only equal to 5 lb. of a Bombay cottoncake containing 1 per cent. of boric acid, an amount which might be exceeded in practice.

Another experiment was undertaken to find out whether a smaller amount of boric acid—*viz.*, 1 per cent.—would be traceable in the milk, and this was found to be so.

There should, however, be no difficulty in distinguishing between milk preserved with boric acid and milk contaminated by the use of foods containing boric acid. If milk contains more than '1 per cent. of boric acid, it has probably been deliberately preserved, as less than this quantity would not be likely to have any preservative effect. If it

contains less than '01 per cent., the source of the boric acid is to be looked for in the food of the cow, whilst between '1 and '01 per cent. the origin would be uncertain.

Milk Sampling.—(*Durham C.C., Education Com., Offerton Bull., No. 3.*)—Careful experiments were made on the variation in the composition of the milk due to sampling. The changes which take place even within a short time owing to the cream rising were very marked. Thus in hot weather a sample from the top of a churn which had stood a quarter of an hour, contained 7'25 per cent. of fat, while one from the bottom of the churn contained only 2'27 per cent. At the end of an hour the variations were still more marked. In cool weather, however, the change was much less rapid.

Influence of Temperature on the Milk Yield.—(*Highland and Agric. Soc. Transactions, Fifth Series, vol. xxi., 1909.*)—It has been, and still is, a common belief that milk cannot be profitably produced in our climate in winter unless the cows are kept warm. This warmth, however, is only secured by the exclusion of fresh air, the temperature being raised by the heat from the animals' bodies, with the result that the air becomes much polluted. It was pointed out that this was likely to be injurious to health, and experiments were therefore undertaken under the direction of the Highland and Agricultural Society for the purpose of testing by accurate records the influence of free and of restricted ventilation on the milk yield of cows.

The experiments were carried out on five farms with 100 cows in all, divided into two lots on each farm. One lot on each farm was kept in a freely ventilated byre, and the other lot in a byre without any special system of ventilation. Arrangements were made for the milk to be weighed and sampled, and for recording the temperature and the moisture of the air, for testing the carbonic acid in the air, and for taking samples of the air for chemical and bacteriological examination.

The conclusions which may be drawn from the results at this stage of the enquiry suggest that fresh air is a much more important factor in the production of milk in mid-winter than is generally supposed, but in order that the greatest advantage may be derived from the fresh air, the animals should at no time have the ventilation restricted in autumn, but should be kept as cool as possible, so that they may not only retain all their hair, but, if necessary, increase it. There is no difficulty, much less impossibility, in producing milk in freely-ventilated byres in the coldest weather likely to be met with in this country, if the cows are allowed free ventilation and kept sufficiently cool in early autumn.

The experiment showed that rather more milk was produced under conditions of free ventilation than where ventilation was restricted, but this may not invariably happen. The percentage of fat was about the same.

Any saving in food which is effected by keeping the animals at a higher temperature is equalled, if not exceeded, by improved digestion when they have plenty of fresh air but a lower temperature.

There is reason to believe that both mammitis and tuberculosis may be reduced to a minimum if cows are kept in freely ventilated byres in winter.

Variations in the Composition of Milk.—(*Dumbarton C.C., Report*

of the Sanitary Inspector, 1907).—This is a report by Mr. David Dunbar, County and District Sanitary Inspector, on the examination of the milk of six cows on a farm near Glasgow. The cows were selected because they were all due to calve about the same date, and the investigation was carried on for a whole year. Samples of both morning and evening milk were taken and tested by the Gerber method daily, so that in all 3,605 samples were dealt with. The investigation did not appear to show any marked seasonal variation in the percentage of butter-fat, nor any relation between the quantity and the quality of the milk of any individual cow. Cows in prime condition did not necessarily produce high quality milk, nor lean cows poor milk. Practically the same variations occurred in the flow of milk when the temperature of the byre and outside atmosphere was high or low. For three or four weeks after the cows were put to grass, there was a marked improvement in the quantity and quality of the milk. The morning milk contained less than 3 per cent. of fat on only 14 occasions during 333 days, while the evening milk was above the standard throughout. Food containing a high percentage of carbohydrates produced a flow of milk, but at the same time reduced the quality. The value of the milk at 8d. per gallon averaged £27 12s. 7d. per cow, but if it had been sold according to quality at the rate of 8d. per gallon containing 3 per cent. of fat, the value would have been £32 1s. 4d. per cow.

Milk Tests and Records.—(*Lancs. C.C. Farmers' Bull. No. 14*).—The Lancashire Education Committee commenced in 1908 the work of recording the milk yield of 14 herds in the county, containing 300 cows. The morning and evening milk of each cow was weighed and tested every three weeks, and the yield was estimated from the weight so obtained.

Eleven cows gave milk containing on the average less than 11.5 per cent. of total solids. A comparison of the value of the milk, judged by its quantity and composition, given by the two best and the two worst cows of various ages, showed very great differences, there being cows in milk that could not possibly be profitable as milk producers. A table showing the cows of all the herds arranged in order of age, with the yield and composition of their milk, bears out the general opinion that young cows give richer milk than older ones, while the great superiority of the older cows as producers of large quantities of milk, which is revealed, is of interest in view of the system often followed of selling out cows at a comparatively early age.

Milk Records.—(*Univ. Coll. of Wales, Aberystwyth, Rept. on Expts., 1907-8*)—This report contains records of the yield and quality of the milk of four Shorthorn and four Welsh cows at the College Farm during the spring of 1908.

Composition of Milk.—(*Jour. Bath and West and Southern Counties Soc., Vol. iii., 1908-9*).—The object of these investigations, which were carried out by the Somerset C.C., was to discover the composition of the milk of a herd of ordinary cows kept under the ordinary conditions prevailing in the dairying districts of Somerset. Daily tests were made for various periods four times in the year, and weekly tests were made almost throughout the year. The milk was also weighed daily. The conclusions arrived at

are almost identical with those obtained in similar enquiries at Leeds, Newcastle, and Edinburgh, the central fact brought into prominence being that the quality of the milk yielded by a cow depends more upon the individuality of the cow than upon any other factor.

While individual cows vary considerably in the frequency with which they give milk low in composition, the milk of cows giving a large quantity is more likely to be deficient in fat than that of cows giving smaller quantities. Certain cows, however, may give a very small quantity of milk of very low quality.

In very hot weather, when the intervals between the milkings are fairly equal, cows may give richer milk in the morning than in the evening.

Feeding Oil to Milking Cows.—(*Jour. South-Eastern Agric. Coll.*, No. 17, 1908).—The question whether it is possible to increase the amount of butter fat in milk by feeding foods rich in oil has been repeatedly tried, with varying results. This experiment, which was carried out in April and May, was intended to test the effect of feeding earthnut oil and cocoanut oil to milking cows in order to find out whether either of these, which are easily procurable, could be used to increase the percentage of fat in milk and to improve the quality of the butter produced.

Three cows were selected and were fed on the following ration for a preliminary period of 12 days: 2 lb. maize germ meal, 4 lb. dried ale grains, 1 lb. molascuit, 5-6 lb. wheat chaff, 2 lb. undecorticated cotton cake, 50-60 lb. mangolds, and hay as required. At the end of the preliminary period, earthnut oil was added to the ration for 16½ days, the quantity being gradually increased from 2 oz. to 8 oz. daily. Cocoanut oil was then substituted for the earthnut oil at the rate of at first 6 oz., then 8 oz. daily. This was continued for 7½ days, and the cows were then turned out to grass, the oil being discontinued and the concentrated food and mangolds decreased. Each cow's milk was weighed and tested for fat after every milking, the milk was used for butter-making, and the Reichert-Meissl number of the butter ascertained.

Neither oil was found to have any appreciable effect on the quantity of milk produced or on the percentage of butter fat in it, thus confirming the view that when a satisfactory ration is given to cows, an addition to the food makes no permanent change in the percentage of butter fat in the milk.

The effect of earthnut oil was to make the butter soft and difficult to work, but it is considered that a small quantity, 2-4 oz. per day per head, may slightly improve the flavour of winter butter.

Cocoanut oil made the cream difficult to churn, but had a hardening effect on the butter, which was of good flavour, texture and appearance. The Reichert-Meissl value of the butter fell only slightly during the oil period, but a longer test would be needed before any definite conclusion could be arrived at respecting the effect of such vegetable oils upon the Reichert-Meissl value.

Milk Tests.—(*Harper-Adams Agric. Coll., Field Expts.*, 1908).—A summary of the results of milk tests made for farmers in 1908 is given in this Report. Attention is drawn to the importance of keeping milk well stirred during the time of delivery to customers, and two

examples are given of the difference in samples taken from the top and from the bottom of the churn. In these two cases, the samples from the top contained 4'60 and 5'90 per cent. of fat respectively, while the samples from the bottom of the churn contained in one case 3 per cent. and in the other only 0'70 per cent. of fat.

Winter Milk Production.—(*Jour. Dept. of Agric. for Ireland, July, 1909*).—Experiments were carried out on two farms in County Cork to compare the profitability of winter and summer milk production. The usual plan in Ireland is for cows to calve from March till May, the greater part of the butter production taking place at the same time. In winter, Ireland places little butter on the market, and consequently is liable to lose the trade, and also has to be satisfied with lower prices when large quantities of summer butter are offered for sale. Farmers have been urged to take up the production of milk in winter, but have objected on the ground that winter milk production did not pay at present prices. The experiments here reported are intended to throw light on the question.

At each farm two sets of five cows were chosen, one lot timed to calve in November, and the other lot in April. The most striking result was the long period during which the November calvers kept up a large milk yield compared with the short period of the April calvers. Thus, in one of the experiments the five November calvers yielded 100 gallons or over for 27 weeks, while the April calvers yielded the same quantity for only 13 weeks, and the difference in the total yield of the two lots amounted to from 100 to 160 gallons per cow. Moreover, the former maintained their highest yield during the months when milk commanded the highest price, and the latter when prices were lowest. The result was that, after allowing for all expenses, the average profit with the winter milking cows was in one experiment £4 6s. 2d. per cow, with the summer milking cows £1 16s. 1d. per cow. In the other experiment, however, the difference was very much less, the amounts being £5 17s. and £4 12s. 11d. respectively.

It is considered that a cow timed to calve in November will produce more milk per annum than when timed to calve in April, the difference in yield being put at from 100 to 160 gallons.

Soft Cheese-making.—(*Journal of the Bath and West and Southern Counties Soc., Fifth Series, vol. iii., 1908-9*).—Experiments were undertaken at the Dorchester Show for the purpose of ascertaining the value of different qualities of milk for making the varieties of soft cheese known as Coulominier, Pont l'Evêque and Camembert. The experiments showed (1) that the profit on making these cheeses is considerably more than on selling the whole milk; (2) that while the milks richer in fat make the better quality cheese, the higher price paid for such milk does not show such a corresponding advantage in the price paid for the cheese as to warrant the use of richer milk than that usually yielded; and (3) that Shorthorn milk is more suitable for soft cheese-making than milk from Kerry cows.

Miscellaneous Dairy Experiments.—(*Journal of Roy. Agric. Soc., Vol. 60, 1908*).—The following experiments were conducted in the Dairy at the Newcastle Show, 1908.

Effect of Pasteurising Milk for Butter-making.—Two lots of milk from the Shorthorn and Jersey breeds were selected for this experiment,

and it was found that the pasteurising of the Shorthorn milk appeared to affect the colour and texture of the butter disadvantageously, while in the case of the Jersey milk no such result was seen.

Ripening Cream.—Two lots of Channel Island cream were taken; one lot was ripened with a pure lactic acid ferment and the other with a lactic ferment which had become contaminated. The butter from the latter, although in appearance, texture and colour as good as the other, had a most unpleasant smell and taste, thus showing the care necessary to be taken to see that the starter is pure and free from contamination. This applies equally whether the starter be butter-milk from a previous churning or a lactic acid ferment specially manufactured.

Colouring of Milk.—The demonstrations carried out at the Lincoln Show with the object of pointing out that the public are taken in by the practice of colouring milk were repeated at Newcastle. Four bottles were filled: (1) with Jersey milk, (2) with white milk from another breed, (3) with separated milk coloured to be deeper than the Jersey, and (4) with separated milk without any colouring matter, and the opinion of the public on them was ascertained. On every occasion, the coloured separated milk obtained the most votes, the Jersey came next, while the uncoloured separated milk received no votes at all, showing that while the public could discriminate between separated and new milk, so long as no colouring matter was employed, they were unable to distinguish between the coloured separated milk and genuine milk of the best quality.

Wensleydale Cheese.—Cheeses were made with milk from Shorthorn, Red Poll, Jersey, Guernsey and Kerry cows with the object of ascertaining whether the richer milks from the Channel Island cattle were suitable for making this class of cheese, and whether the cost would be the same. The result appeared to show that the milks richer in fat made better cheese than those containing less fat, but the colour of the richer cheese was deeper than the accepted colour of a Wensleydale. Assuming the milks to be of equal value, the cost of making Wensleydale cheeses from the richer milks was less than from the poorer milks, and in addition the profit on the cheese made from the richer milks would be more than the difference in weight discloses, because, in addition to the excess of weight, the higher price obtainable for a better quality cheese must be taken into consideration.

FOREIGN AND COLONIAL EXPERIMENTS.

Dressing Seed as a Protection against Birds.—Experiments have been conducted by the German Imperial Biological Institute with a view to ascertain the degree to which seed can be protected from the attacks of birds, particularly rooks, by dressing it so as to give it an unusual colour, or an objectionable taste or smell.

The colours used were blue, red, and green, and the following proportions were found most effective:—For every 100 parts by weight of seed, 0.2 part of glue dissolved in 8 parts of water, with 2.0 parts of red colour, or from 0.5 to 1.0 part of Prussian blue, or 0.4 part of aniline green. The colour dressing did not affect the germinating capacity of the seed.

For the purpose of imparting a flavour to the seed, powdered alum, Glauber's salt, a preparation called *Fichtenin*, and a solution of tobacco

extract were tried, but failed to give the seed a noticeable taste. Seed dressed with powdered aloes, however, in the proportion of 100 parts by weight of seed moistened with 8 parts of water containing 0.6 part of powdered aloes, acquired a very bitter taste. The germinating power of the seed did not appear to suffer.

Tobacco extract, Fichtenin and fusel oil proved useless for giving a noxious smell to the seed, but a 3 per cent. creolin solution in 8 parts of water to 100 parts of seed was satisfactory.

Four experiments were carried out as follows:—

(a) 200 grammes each of seed dressed with Prussian blue, red, and aniline green, and of undressed seed, were placed in a large cage containing ten rooks, and the feeding boxes were arranged in such a way that the birds had to pass the coloured seed to get at the undressed seed. After a short time it was found that the amounts eaten were respectively 3 grammes of seed dressed with Prussian blue, 35 grammes of that treated with red colour, 8 grammes of that treated with green, and 68 grammes of undressed seed.

(b) Two rooks were placed in a large cage, the floor of which was divided into 11 beds. They were fed on corn, etc. for about nine days, to allow them to become accustomed to their surroundings, after which the beds were sown in rows with seed both unprepared and prepared in all the above ways. The experiment lasted four days, and it appeared that the seeds dressed with Prussian blue, creolin and aloes were most shunned by the birds, though it was difficult to determine the point exactly.

(c) In the third experiment, eight rooks were used and 100 grammes each of seed undressed and dressed with Prussian blue, red and green were thoroughly mixed and placed in a feeding box so constructed that seeds dropped by the birds would fall into the box again. After 24 hours it was found that 51 grammes of blue, 57 grammes of red, 55 grammes of green and 94 grammes of undressed corn had been eaten.

(d) The fourth experiment was conducted under the same conditions as the second, but the seeds were allowed to germinate with a view to ascertain what proportion of plants survived. Three beds were sown on the 20th June with undressed seed and with seed dressed with Prussian blue and powdered aloes respectively. Two rooks were kept in the cage for 48 hours. After 9 days it was found that the bed sown with unprepared seed contained 247 plants, while the seed dressed with Prussian blue and powdered aloes had produced 796 plants and 760 plants respectively.

Dressing with a blue colour appeared, on the whole, to be most effective, while green and the creolin dressed seed were also avoided. Red seemed of little value, but the aloe dressing was very satisfactory. The cost of the preparations was comparatively trifling.

How far the results obtained in these experiments are applicable to ordinary practice is a matter for further investigation, but they appear to show that rooks in their search for food are influenced by colour, smell and taste.

Use of Calcium Cyanamide as a Remedy for Charlock.—Reference has been made in previous numbers of this Journal (December, 1907, p. 568; January, 1909, p. 776) to the use of calcium cyanamide as a means of eradicating charlock. The "*Praktische Blätter für Pflanzenbau und Pflanzenschutz*" (August, 1909) mentions an experiment conducted at Altenmarkt in which two plots under oats were treated with a top dressing of calcium cyanamide on 8th May, 1909. Observations taken on the 12th June showed that very little charlock was left on the manured plots, as compared with those unmanured, while the charlock on the unmanured plots was much stronger. A few days after manuring the charlock had a burnt appearance, but the clover underneath, and peas which were sown among the oats were not injured. The manured oats showed a rich green colour.

Destruction of Charlock.—Numerous experiments have been made in Great Britain on the destruction of charlock (*Sinapis arvensis*, L.) by means of solutions of the sulphates of copper and iron. These have been found effective in killing the weed in the young stage, and the Board have issued a Leaflet (No. 63) in which the treatment is described.

At a recent meeting of the *Société Nationale d'Agriculture*, M. Hitier suggested that, on small holdings, where only a few acres have to be treated, the trouble and expense of carting water and of preparing and applying the solution may be obviated by the use of sulphate of iron in the form of a fine powder, broadcasted by hand or by a machine very early in the morning (say 3 to 6 a.m.) when the dew is on the leaf. This had been found effectively to destroy charlock.

Last year M. Hitier himself treated oats in this way, the charlock which it was desired to destroy being exceptionally abundant and near the flowering stage. It was, however, completely destroyed. The amount of sulphate of iron used was 3 to 4 cwt. per acre. At the price paid for it, 3s. 3d. to 3s. 9d. per cwt., the treatment is no more economical than treatment with solutions of sulphate and nitrate of copper, but it is held to be much more practical for the small holder, and even, perhaps, for the large farmer.—(*Bull. des Séances Soc. Nat. d'Agric.*, 1909, No. 5.)

The Asparagus Beetle.—Asparagus is occasionally much damaged by the Asparagus Beetle (*Crioceris asparagi*), an account of which is given in the Board's Leaflet No. 47. As one of the remedial measures, it is stated that the asparagus may be sprayed with arsenate of lead, made by dissolving 1 oz. pure arsenate of soda in a little water, dissolving 3 oz. acetate of lead, also in a little water, and pouring both into 10 or 12 gallons of soft water, finally stirring in 1 lb. of treacle.

In this connection it may be remarked that an experiment is reported by Dr. F. H. Chittenden, of the Bureau of Entomology, U.S. Dept. of Agric. (*Bull.* No. 66, Part vii.), which shows that arsenate of lead may be used with complete success against the Asparagus Beetle. In one case the first application, made with a compressed-air sprayer, consisted of 1 lb. arsenate of lead to 20 gallons of water, and the second application, made a week later, of 1 lb. arsenate of lead to 15 gallons of water. The first application destroyed most of the insects, but a considerable number developed after a few days, and these appeared to be killed by the second spraying. Neither application seemed to injure the asparagus in the least, though the liquid adhered in fine

drops on the foliage for some time. In another case it was difficult to find any but dead larvæ on the plants after one thorough spraying, though subsequent sprayings were necessary, as beetles came from neighbouring gardens while the growing plants presented fresh, unsprayed foliage for the pest to live upon.

OFFICIAL CIRCULARS AND NOTICES

The Board have addressed the following circular letter, dated 22nd November, to occupiers of premises infected with Wart Disease:—
SIR,

I am directed by the Board of Agriculture and Fisheries to inform you that they have for some time past been engaged in investigating the nature of the potato disease, known as Wart Disease, Black Scab, Cauliflower disease, etc., which was present in your potatoes this year, and they have endeavoured to discover some remedy. As you are no doubt anxious to avoid a repetition of the disease among your potatoes, I am directed to send you the following information.

Experiments on Wart Disease were carried out on behalf of the Board by the staff of the Education Committee of the Lancashire County Council, of the Harper Adams Agricultural College, Shropshire, and of the Holmes Chapel Agricultural College, Cheshire. The experiments were made on infected land at five places. In each experiment tests were made (1) on the effect of possible remedies; (2) on a number of varieties of potato, in order to ascertain whether they did or did not contract disease.

Three possible remedies, viz., Sulphur, Quicklime, and Soot were applied, but in every case they failed. No one of them prevented the crop from being badly diseased. Sulphur was also tried on many allotments and gardens, but in nearly every case without success. It is possible that in another season better results might be obtained, but it is clear from the experience of 1909 that when ground is infected, the use of sulphur, lime, or soot cannot be relied upon to save potatoes from Wart Disease.

The trials with varieties were more successful. The following sorts were tested and were found to be *attacked by Wart Disease*:—Up-to-date, Northern Star, King Edward VII., Eldorado, Royal Kidney, British Queen, Talisman, Epicure, Sharpe's Express, May Queen, Ninetyfold. All were badly affected, though some were worse than others.

The following sorts were tested and were found to be *not attacked by Wart Disease*:—Langworthy, What's Wanted, Golden Wonder, Sutton's Abundance, Findlay's Conquest and (?) Snowdrop.

Snowdrop was not grown at all the centres. It was found that the stock of this potato was not true, a kidney form (probably true stock) was quite free from disease, but an oval form was diseased. In many cases information has reached the Board that Snowdrop is free from Wart Disease, and in other cases disease has been reported. This variety should therefore be regarded with suspicion. True stocks are

probably safe, but there would seem to be some difficulty in securing Snowdrop potatoes true to type.

Traces of disease were found on one or two plants of Abundance and Conquest at one centre, but it is possible that the affected plants were "rogues," for not a trace of disease was found on these varieties at other centres, although growing on soil on which almost every plant of Up-to-date was diseased.

No trace of disease was seen on Langworthy, What's Wanted and Golden Wonder. These three sorts all belong to a type of potato formerly well known as Clarke's Maincrop. The first two are much alike; the third is a brown skinned potato of good quality grown in some parts of Scotland, but not yet common.

Of the various sorts which were not affected by disease, Conquest and Snowdrop are early, and the others late in ripening.

Growers who have infected soil should procure seed of one of the sorts that do not contract disease. Conquest would probably prove best for early use, and Langworthy as a late or field potato.

This letter is being sent to you before the information is made public, in order that you may at once take steps to purchase the seed you require for next year.

Growers, where land is infected, should avoid not only Up-to-date, but all varieties of the same class, that is, varieties having the same kind of haulm and flower, such as Factor, Table Talk, Dalhousie, Highlander, Mayfield Blossom, Duchess of Cornwall, Hero; they should similarly avoid potatoes of the same type as British Queen, Royal Kidney, or any other of the affected varieties.

The importance of following this advice cannot be too strongly insisted upon. Wart Disease is not very widely spread in Great Britain, but it is very bad in allotments and gardens in most places where it has appeared. No ordinary crop is liable to be attacked by it except the potato, and if everyone plants, either disease-resisting varieties of the potato, or some other crop on his holding, it is likely that the disease will die a natural death and disappear. But it must be borne in mind that to secure this, no potatoes that are liable to attack should be planted in infected ground for many years.

I am, &c.,

T. H. ELLIOTT,
Secretary.

The Board of Agriculture and Fisheries are informed that the Lancashire Farmers' Association are taking steps to induce their members to adopt cultural methods for

"Leather Jackets." reducing the numbers of the larvæ or grubs of Daddy Longlegs, or Crane Fly, and the Board desire to bring this information to the notice of all farmers in the north-west and north of England and the south-west of Scotland, in which districts these grubs, known as Leather Jackets, have wrought great injury in recent years, more especially to the oat crop.

The methods recommended are as follows:—Clover leys which are to be sown with cereals to be closely cropped and a dressing of gas lime applied. The land to be skimmed and the cultivator used several times, so that the grubs not destroyed by the lime will be brought to

the surface and picked up by birds. The autumn sown land to be well harrowed and well rolled with the Cambridge roller in spring, and a dressing of one or two cwt. of nitrate of soda applied per acre. A leaflet on the subject can also be obtained from the Board free on application.

The Library of the Board of Agriculture and Fisheries contains a large number of books, including foreign periodicals and official publications, relating to all branches of agriculture. These books may be consulted by students and other persons interested in Agriculture at the Office of the Board, 8, Whitehall Place, London, S.W., on any week-day between the hours of 10 a.m. and 5 p.m. (Saturdays, 10 a.m. to 2 p.m.). Application should be made to the Publications Branch.

**Library of the
Board of
Agriculture and
Fisheries.**

Loan of Books.—In order to make the Library accessible to students resident in the country, the Board are prepared to lend books where they are satisfied that the privilege will be of value. Applications for permission to borrow books must be made by letter or on the form provided for the purpose. The applicant must undertake to return any books lent in good condition, carriage paid, within fourteen days from the date of issue. Not more than three books are lent at the same time, and books must be returned at once if required. Pamphlets must not be folded. Bulky works, and works which are in frequent use for purposes of reference, are not lent.

IMPORTATION REGULATIONS.

Importation of Potatoes into Australia.—In connection with the proclamation published in the *Commonwealth Gazette* for 10th July last and summarised in this *Journal*, November, 1909, p. 671, it should be noted that the importation of potatoes into Australia is prohibited from any country in which Potato Disease (*Phytophthora infestans*) exists.

Quarantine of Cattle imported into the United States.—By a regulation of the 28th September last the period of quarantine for cattle imported from Great Britain, Ireland, and the Channel Islands is shortened to thirty days from the date of arrival at the quarantine station. The regulations which have thus been amended were summarised in this *Journal*, September, 1907, p. 360.

Disinfection of Hides imported into the United States.—Circular No 52 of the U.S. Treasury contains the regulations for the importation of hides. Certificates of disinfection signed by the American consul for the district from which the hides are shipped will be required upon the entry of hides of neat cattle, except hard, sun-dried and arsenic-cured hides, which will be considered as having been disinfected by the process of curing. Hides which have not been sun-dried or arsenic-cured must be disinfected. Disinfection may be done by immersion in a 5 per cent. solution of carbolic acid, or a 1 to 1,000 solution of bichloride of mercury, until the hides are thoroughly wet with the disinfectant, or by sulphur dioxide, in which case a room must be

provided which can be tightly closed and the bundles of hides must be undone and each hide suspended separately in such a manner that there may be a free circulation of the sulphur fumes and that all parts of the surface may be acted upon. Fresh or moist hides, whether salted or not, must be disinfected with carbolic acid or bichloride of mercury.

All hides of neat cattle, whether salted, sun-dried and arsenic-cured, or fresh or moist, shipped from a section of the country in which anthrax is prevalent must be disinfected by immersion for thirty minutes in a 1 to 1,000 solution of bichloride of mercury, under the supervision of a representative of the consul.

Officers of the U.S. Customs are directed to treat hides of neat cattle shipped to the United States without proper disinfection as prohibited importations, and to refuse entry of such hides, including calfskins, hide cuttings and parings, or glue stock, except such as have been sun-dried or arsenic-cured or lime-dried, after soaking for forty days in a strong lime wash made by slaking quicklime in water and containing sufficient lime to be of a creamy consistency; and except abattoir hides, the product of Sweden, Norway, New Zealand, Australia and Great Britain, and hides taken from American cattle killed in lairages in Great Britain, as the disinfection of such hides in the United States, or storage of the same in general order warehouse, will not be permitted, as the passage of diseased hides through the country or storage with other goods would tend to the dissemination of cattle disease.

MISCELLANEOUS NOTES

The Exhibitions Branch of the Board of Trade state that a communication has been received from the Commissioner appointed by His Majesty's Government to represent British interests at the forthcoming International Agricultural Exhibition at Buenos Aires, to the effect that a covered space of 50,000 square feet has been obtained as a site for a British Section.

The Exhibition will be open from the 3rd June to the 31st July of next year, and will include exhibits of all classes of livestock; agricultural products; seeds, plants, etc.; agricultural machinery; tools and other implements. There will be no charge for space in the British Section.

With regard to the transport of exhibits, the shipping companies comprising the International River Plate Conference have agreed to carry back free of charge all unsold exhibits weighing less than three tons which may have been shipped to the Exhibition by their steamers. Such exhibits must be consigned from Buenos Aires to the original port of shipment before the end of 1910. A reduction of 50 per cent. will be made on the return freight of packages weighing over three tons.

The Official Programme of the Agricultural Exhibition, containing full information as to the regulations and the classification of exhibits, may be obtained on application to the Exhibitions Branch, Queen Anne's Chambers, Westminster, S.W.

Applications for space should have been forwarded to the same

address not later than the 3rd December, or sent direct to the Commissioner, Mr. C. E. Akers, c/o The British Legation, Buenos Aires, so as to reach him by the 31st December.

An account of the Exhibition appeared in this *Journal*, July, 1909, p. 330.

Flower and Fruit Shows will be held in Brussels next year in connection with the International Exhibition, and copies of the Official Programme and the Entrance Forms for these

**Horticultural Shows
at the Brussels
Exhibition.**

shows may be obtained on application to the Secretary to the Horticulture Committee, 8, Whitehall Place, S.W.

The first Show will be held from the 30th April to the 3rd May, 1910, and is for Hardy and Hothouse Plants, Forced Fruit and Vegetables, and will include a section for Floral Decoration. It will be divided into 34 sections and 662 classes, with two or three prizes, consisting of medals, in each class. Entries close on 15th April, 1910.

The second Show, from the 24th to the 27th September, is for Fruit and Market Garden produce, and will be divided into 3 sections and 119 classes, with from 2 to 12 prizes in each class. Entries close on 10th September, 1910.

The last Show, to be held from the 29th October to the 2nd November, is for Flowers and Chrysanthemums and will be divided into 9 sections and 135 classes, with two or three prizes in each class. Entries close on 10th October.

Agricultural Population of Germany.—The Report for 1908 on the Trade of the Consular District of Berlin (*F. O. Reports, Annual Series*,

**Notes on
Agriculture Abroad.**

No. 4,282) contains particulars of the results of the census of 1907. It appears that the number of persons returned as engaged in agriculture, gardening, &c., in that year was 9,732,000, as against 8,156,000 in 1895. There was thus an absolute increase in numbers, though this increase has not kept pace with the general increase of the population, so that the agricultural group now represents only 39½ per cent. of the total occupied population, as compared with 43 per cent. in 1895, and 50 per cent. in 1882. The number of earners in this group, with their dependents and domestic servants, was 17,243,000, as against 18,069,000 in 1895, so that the absolute number of the population depending for their livelihood on agriculture, gardening, and the rearing of stock, &c., has actually decreased.

Mr. Consul-General Schwabach observes that the demonstration of this statistical fact in no way warrants the conclusion that the economic importance of German agriculture has declined in proportion to the decreased number of the population engaged therein. Such a conclusion would be erroneous, inasmuch as it is mainly in the classes of domestic servants and workmen that the decrease above alluded to has taken place; that is to say, this decrease is neither more nor less than a numerical expression of the well-known "dearth of agricultural

labourers." On the contrary, it may be said that the strength and productive power of German agriculture have been augmented.

Potash Production in Germany.—The same report refers to the operations of the Potash Syndicate in 1908. The turnover was £4,917,000, a larger amount than in any preceding year. The syndicate has been forced to reduce the price of potash salts for 1909 in various countries, but no reduction has been made in the home trade. There is a feeling of uncertainty as to the issue of the negotiations for the renewal of the syndicate agreement which terminates at the end of 1909.

Agriculture in the United States.—The Report for 1908 on the Chicago Consular District (*F. O. Report, Annual Series, No. 4,229*) refers to the condition of agriculture in the 11 northern States, which are included in this Consular district. It is mentioned that in the last few years there has been a surprising change in the condition of farmers. Several times in years gone by farmers have been prosperous, and the outlook for men employed in agriculture looked bright, but low prices and bad harvests came, and the farmers had to mortgage and often lose their farms; but now this seems to be all changed, as, notwithstanding larger crops, the price of everything produced remains high, or goes up, and the farmer is no longer in the unfavourable position that he was. If he has a mortgage now, it is, as a rule, to enable him either to buy more land, to hold on to his crops, or to make improvements in building, draining, or improving stock.

All through the farming States systematic draining is now seen, and many farmers manure heavily. In cattle raising, the country is in a transition stage, as the time of the open range is passing, and as yet the farming land does not carry the number of cattle that it should. There are several reasons for this, one being the high price obtainable for all grains, making it more profitable to sell than to feed, and another that many of the farmers who have recently taken up land have to get money and cannot keep their cattle and feed them to maturity. It results from this that an undue number of half-fed cattle and young calves come to market. The number of cattle in the country on January 1st—50,692,000—was nearly 1,000,000 less than in 1907, but if the slaughter of calves were restricted in some way, the supply of beef would rise from year to year.

The question of the future supply of cattle is a puzzling and very complicated one, as in the United States the finishing feed consists mainly of maize, the price of which for the past two years has been very high, notwithstanding the large crops, and of which large quantities are now used for making glucose and corn products. Many of the cattle ranges are gone, and the rest are going fast, whilst in their place small farms are springing up which will in time produce many more cattle to the acre than the ranges did, but until these new farmers find their feet there is little chance of a marked increase in the supply, while the demand for domestic use is never likely to decrease.

There are 5,235 creameries, and 3,610 cheese factories in the United States, of which 3,042 and 1,805 respectively are in this Consular district. The centralised dairies are increasing and gradually ousting out those which make butter from whole milk. The manufacture of butter on the farms is decreasing, and more separators are used annually,

enabling the farmer to send his cream to the centralised factories, where it is made into butter. This mode of managing the dairy industry is becoming more and more popular, as it is a great saving of labour, and the farmer has the skim milk for his pigs. With the whole milk dairies he has to cart the milk to the factory and recart the skim milk back again if he wishes to use it, whereas under the new system one farmer can take the cream of many of his neighbours to the railway depôt, while the rural mail carts will also carry it for a trifling amount. The rapid growth in popularity of the separator is shown by the fact that in the State of Omaha there were in 1897 only 550 separators in use, whereas in 1908 there were 35,000.

Export of Butter from Finland.—The Report on the trade of the Consular district of Helsingfors (*F.O. Report, Annual Series, No. 4306*) refers to the export of butter, most of which comes to Great Britain, and states that the Finnish Government have erected a new warehouse on the shipping quay at Hango for all butter intended for export, and have supplied refrigerators for keeping the butter in perfect condition whilst being sampled and weighed. These will be of great benefit, especially during the summer months. The steamers are also fitted with refrigerator rooms, and the butter will now, from the moment it reaches any railway station in the Grand Duchy, be taken care of in the best possible manner.

It has also been decided to exhibit at the Grocers' Exhibitions in Great Britain for the coming three years, in order to make known and advertise the butter to the British public. The cost will be met by the Finnish Government.

Dairy Industry and Agriculture in Uruguay.—The report on the trade of Uruguay in 1908 (*F.O. Reports, Annual Series, No. 4320*) states that efforts are being made to encourage the dairy industry, which should be one of the most important industries in a pastoral country. A project has been laid before the legislature for granting exemption from the import duties on the boilers and motors for dairies and creameries, the electric apparatus and machinery for lighting the same, and for the manufacture of the sub-products of skimmed milk, the machinery and utensils for butter factories and creameries, and the parts for renewal of the same. It is also proposed to exempt the factories and creameries from property and licence taxes for a period of ten years. The Executive is authorised to organise for the winter of 1910 a National Exhibition of milk products, expending 20,000 dols. in prizes and other expenses.

The report of the Official Committee in charge of this project mentions that there are in the country between 2,000,000 and 3,000,000 head of cows, and if the milk of one-tenth part of these were properly used, it would permit of an exportation exceeding that of the agricultural products. To attain this, however, it would first be necessary to improve the strain of the cows themselves, and the conditions under which they are tended. If this project becomes law it may provide an opening for the export of British machinery and live stock.

The Report also gives information as to the state of agriculture and the exports of cereals and wool.

Agriculture and Horticulture in Oregon and Adjoining States.—Mr.

Consul Laidlaw has furnished a report on the agriculture of the Consular District of Portland, comprising the States of Oregon, Washington, Idaho, and Montana, and the territory of Alaska.

As regards hops, it is stated that there was in 1908 a considerable reduction in the acreage cultivated. The area in Oregon was about 22,000 acres, and in Washington 4,000 acres, the production being 87,500 and 17,500 bales (of 185 lb.) respectively. The experience of growers was again disastrous, and has resulted in a further diminution of the area planted.

In all four States, there has been a continued increase in the area devoted to fruit growing, and very high prices have been paid for suitable land. All fruit is very carefully inspected under the horticultural laws of the States, and any diseased fruit offered for sale is confiscated and destroyed. The Commissioners have also power to destroy orchards that are diseased, unless the owners take steps to exterminate the evil.

In some sections the yield of apples and pears was very light on account of the early frosts in the spring, but the general result was a larger crop, in consequence of new orchards coming into bearing. This increase is likely to continue, as there is constant planting going on throughout the district. Some orchards threatened by frosts were saved by building open fires and others by using smudges, and these methods will be more fully tried in future when there is danger of damage by frosts. Prices were considerably lower than in 1907, but the business of growing high-class fruit was undoubtedly profitable.

Formation of a Horticultural Commission in France.—In view of the importance of the horticultural industry in France, the Minister of Agriculture has recently recommended the formation of a Technical Commission attached to the Ministry for the purpose of advising on Horticultural questions, and considering what measures can be taken for the promotion of the industry. The Commission will consist of 9 members *ex-officio* and 30 nominated members representing horticulture.—(*Bulletin Mensuel*, October, 1909).

Herring Flour as Cattle Food.—The British Vice-Consul at the Lofoten Islands (Mr. J. Berg) reports that there is a growing manufacture, in a specially built factory, of "Sidmel" or "herring flour," made directly from the fresh herring. Large quantities of this "flour" go to Southern Norway for feeding cattle, it having been found that an admixture of the powder with the ordinary cattle food greatly increases the yield and quality of the milk.—(*Board of Trade Journal*, October 14th, 1909.)

During the *first* week of November, the weather was much drier in the south and south-east than during the last weeks of October, but the sky was frequently overcast, and there was a good deal of fog or mist. The rainfall was generally "light" or "very light," but "moderate" in England E., and bright sunshine was a little below the average.

Notes on the Weather and the Crops in November.

During the *second* week fairer conditions prevailed over the Kingdom, but warmth was "deficient" everywhere. Bright sunshine

was "abundant" in Scotland, and "very abundant" in every part of England, while rainfall was in most places "light" or "very light."

During the *third* week the weather was generally fine and dry, but cold. Warmth was "deficient" in England E. and S.E., "very deficient" elsewhere, and some very low temperatures were recorded. Sunshine was "very abundant" in the western section of the United Kingdom and in Scotland E., and England S.E. It was abundant in England N.E., and the Midlands. Rainfall was less than the average, the deficit being large in almost all places.

During the *fourth* week the weather was again fair on the whole, and sunshine was "abundant" ("very abundant" in England S.W.) except in the Midlands. Warmth was, however, "deficient," and the rainfall generally light.

The reports received from Berkshire indicate that in this district the weather was favourable for agriculture. One correspondent says: "the fair time enabled the farmers to store the mangolds in good condition, and to plant the wheat in a fair tilth, although a little late; and it also allowed the remaining damaged corn to be put together. On the 13th November, I saw the rare sight of a farmer carrying oats in one field and barley in another. There has been very little rain, but several severe frosts, though nothing to hinder farm work, which is now quite up to date."

Another correspondent from Berkshire describes the month as a "grand one for farmers and outdoor workers." "Large breadths of wheat have been sown, and seeds such as vetches planted. Mangolds have also been raised and clamped under favourable conditions. Turnips have also thrived and headed well. The young wheats that are up are looking well."

The following report received from Kent—too late for insertion last month—illustrates the weather in October:—"During the first fortnight of October, there were a considerable number of different kinds of fungi in a meadow between my house and the river. One day I invited some friends to come and have a competition as to who could find the greatest number of different kinds. The winners considered they found seventeen different species. I think one may say that there were, at any rate, fourteen different kinds of fungi growing in this field at one time, a thing I have never seen before."

Germany.—The report on the condition of the autumn sowings in the middle of November, issued by the Imperial Statistical Bureau, states that where the work was done in good time, the condition of wheat and rye is generally satisfactory and frequently the growth of the seed has been good or very good. This applies especially to the rye as the wheat was nearly everywhere sown late.

Hungary.—The Ministry of Agriculture reported in the middle of November that the weather in the autumn had been very favourable for the growth of crops, and the sowings had consequently prospered.

Argentina.—H.M. Minister at Buenos Aires, in a despatch dated October 29th, states that in the absence of storms and frost during the next six weeks, an average yield is expected. Preliminary official estimates of the areas sown with wheat, oats, and linseed, show a decrease of six per cent., and the official view is that the general condition of the crops at the present moment is of a higher average than at a similar period last year. Private information as to the maize area indicates an increase. It is stated that land that owing to drought could not be ploughed in time for wheat or linseed is now under maize, as well as some land on which the early linseed had been eaten by locusts. An optimist view is that the shortage in wheat, linseed, and oats will be compensated for this year by an increased production of maize.

United States—The preliminary estimates of the crops in the United States (which have been given in previous numbers of the *Journal*) are summarised as follows, in the *Crop Reporter* for November :—

	Thousands of bushels	
	1909	1908
Maize	2,767,316	2,668,651
Wheat	724,768	664,602
Oats	983,618	807,156
Barley	164,636	166,756
Potatoes	367,473	278,985

The newly sown area of winter wheat in December is estimated at 33,483,000 acres, an increase of 12 per cent. on the area last year. The condition was 95 8, as compared with 85 3 in 1908.

Canada.—The yield of potatoes is reported in the November Bulletin of the Census and Statistics Office to be 99,087,000 bushels, which is 22,697,000 bushels more than last year.

Russia—According to reports received in November by the Russian Ministry of Agriculture, the condition of the winter grain crops appeared to be bad nearly everywhere in the Black Earth zone. The early sown crops germinated well, but suffered from long drought. The area sown with winter crops is much below the average from the same cause

The Board of Agriculture and Fisheries have been furnished by the Board of Trade with the following report, based on returns from correspondents in various districts, on the

**Agricultural Labour
in England
during November.**

demand for agricultural labour in November :—
Agricultural employment was generally regular in November. Potato lifting, pulling and storing roots, and thrashing, together with the arrears of farm work arising from the wet weather in the previous month, caused a fairly good demand for day labourers. There was, however, an adequate supply of such men in the majority of districts reported on.

Northern Counties.—In *Northumberland, Cumberland* and *Westmorland* there was some irregularity of employment with day labourers on account of frosty weather, which interfered with potato lifting, turnip

pulling, &c. Employment was generally regular in *Lancashire*, but some loss of time occurred in the case of men employed on the potato crop. A downward tendency in wages was reported at the half-yearly hirings for single men in *Cumberland*, *Westmorland* and *Lancashire*. Little or no irregularity of employment was reported from *Yorkshire*, where thrashing, pulling and storing roots, and manure carting provided a large amount of work in many districts. There was a plentiful supply of farm servants at the *Martinmas* hirings, and wages generally remained about the same.

Midland Counties.—Employment was fairly regular in *Cheshire* and *Derbyshire*; there was a good supply of day labourers, but the demand for men for permanent situations was not always satisfied. Thrashing and work on the potato and root crops generally provided regular work in *Nottinghamshire* and *Leicestershire*, and the supply of and demand for labour were about equal. A fairly good demand for extra labourers, with a corresponding supply, was reported from *Staffordshire* and *Shropshire*. There was some surplus in the supply of day labourers in *Worcestershire* and *Warwickshire*; a correspondent in the Shipston Union (*Worcestershire*) refers to the sodden state of the land as the cause of the small demand prevailing in his district, since much farm work was thereby rendered impracticable. Thrashing and getting up potatoes and the root crops provided a good deal of employment in *Northamptonshire*, where the supply of labourers was generally equalled by the demand. Day labourers were fairly well employed in *Oxfordshire* and *Buckinghamshire*. There was generally full employment for extra men in *Hertfordshire* and *Bedfordshire*, where thrashing and work on the potato and root crops caused a good demand for labour; an insufficient supply of such men was reported from the Buntingford Union (*Hertfordshire*).

Eastern Counties.—The supply of day labourers was generally equalled by the demand in *Cambridgeshire*, where few men were reported in irregular work. There was a good demand for day labourers in *Lincolnshire*, and there was some scarcity of men for securing roots; one correspondent, however, reports that this had been remedied in his district by the retention of Irish labourers after finishing the potato harvest. Some little interruption to outdoor work on account of wet weather was reported in *Norfolk* and *Suffolk*, but, generally speaking, work on the root crops (which were described as unusually large), and clearing off arrears in other work from the previous month, provided full and regular employment in these counties. The supply of extra labourers was, however, usually sufficient. Similar reports come from *Essex*.

Southern and South-Western Counties.—Employment was fairly regular in *Kent*, where raising potatoes and roots, thrashing, hedging and ditching, and manure spreading caused a fairly good demand for day labourers. The supply of these men was rather above the demand in several districts, but a correspondent states that in the Bridge Union there were not as many out of work as a year ago. According to reports from *Surrey* there was some surplus in the supply of extra labourers, one correspondent stating that the arrears of work had been cleared off by the middle of the month. There was generally only a

moderate demand for extra labourers in *Sussex* and *Hampshire*. Thrashing and storing mangolds provided a good deal of work in *Berkshire*, but the supply of extra labour was usually sufficient. The demand for day labourers was fairly good and constant in *Wiltshire*, but the supply was adequate, and several correspondents mention a surplus of labour in their districts. The supply of and demand for extra labourers were generally about equal in *Dorset* and *Somerset*. In *Herefordshire* and *Gloucestershire* the demand for extra labourers was reported as normal, the supply being usually quite sufficient. Men for permanent situations were, however, in request in certain districts of the latter county. Thrashing, digging potatoes and storing mangolds caused a fairly good demand for extra labourers in *Devonshire* and *Cornwall*, the fine weather enabling most men to obtain regular employment.

THE CORN MARKETS IN NOVEMBER.

C KAINS-JACKSON.

Fair to good home supplies of grain, liberal imports, and good shipments, have failed to make "the dullest month of the cereal year" duller than usual; in fact the last ten or twelve days of the month, while scarcely attaining to buoyancy, were marked by more steady retail business than in the majority of years. The American markets during November gained in strength on the speculative side. Grain was taken up regularly for actual use and in good quantity, which had a strengthening influence on the United Kingdom exchanges.

Wheat.—At the end of November very few markets reported an average below thirty shillings. London, on the 27th, quoted 34s. 1d.; Canterbury, on the 27th, 34s. 8d.; Ipswich, 33s. 5d. on the 23rd; and Norwich, 33s. on the 27th; these prices were indicative of some recovery from earlier in the month. During the last fortnight of November, a materially increased proportion of new English wheat showed fair to good milling quality, besides reaching the market in improved condition, and in a reasonably dry state.

The demand for seed wheat lasted well through the month. The finest dry English wheat during November has made 42s. to 44s. per 504 lb. for 1908, and 38s. to 40s. for 1909 grain. Chicken wheat has gone readily into sale at 30s. to 31s. per 448 lb., and there has also been a fair sale of low medium wheat at 32s. to 34s. per 480 lb.

Imported wheat has lost no ground. America's new crop has got into motion in quantity, but 40s. was paid for Hard Winter at Mark Lane on the 29th per 480 lb., and 8s. 3d. per cental was made at Liverpool on the 30th. Spot markets have seldom shown more confidence in the face of heavy shipments. The best Russian wheat, which at the end of October made 41s. 6d., was still fetching 40s. 6d. to 41s. at the end of November, though the shipments of the month had been very large. Other sorts of foreign wheat at the end of November are fully as dear as at the end of October. Liverpool was understocked, and had little to offer to millers of such well-known wheat types as Chilian, American Spring, second and third grades from the Dominion,

or of the three Pacific sorts: Standard Californian, Walla Walla, and Blue Stem. Sales of home-grown wheat were but moderate; farmers found millers by no means unready buyers, but thrashings were not unduly hastened. Imports of breadstuffs did not differ materially from the total of November, 1908, and were materially smaller than for November, 1907. American shipments were 1,662,000 qrs., which, although an increase from October, 1909, was less than for November, 1908. Argentine, Indian, and Australian shipments were not important. Russia has shipped 3,247,000 qrs., the largest November total on record. Yet, on the last day of November, only 350,000 qrs. of Russian wheat were on passage to the United Kingdom. The Continent is reported to have taken a record quantity of Russian wheat in the first three months of this cereal year—1st September to 30th November, 1909—but the figures are not yet available. The wheat supply on passage to the United Kingdom on the last day of November was 1,698,000 qrs.

Flour.—Excessive supplies of poor to medium quality country flour have produced a depression at Mark Lane, not felt in the country itself. In order to effect clearances, this country flour, at the end of November, was pressed on London bakers at 26s. 6d. for Straights, 25s. 6d. for Roller Whites, and 24s. 6d. for Stone-ground. London mills had to take 34s. 6d. for Best Grade, 32s. 6d. for Town Whites, and 29s. 6d. for Town Households, as a result of this pressure, but the London mills were not weak, except in this incidental manner. American flour ground from new American wheat, has come to hand, and is serviceable flour which meets with considerable attention from the baker. It is quoted at 33s. for finest Minneapolis and Duluth, 32s. 6d. for ordinary fine, 31s. for good second-grade patents, 28s. 6d. for Iron Duke, and 27s. 6d. for second bakers' grade. Fine Canadian ranges from 30s. 6d. to 32s. 6d. per sack in London, Liverpool quoting 32s. to 33s. Flour made from "Alberta," which is Canadian good autumn-sown wheat, makes 32s. 6d. per sack. These prices are likely to be lowered during December, as the offers for December early shipment at 30s. to 31s., are inclusive of the very best grades of the Lake Superior, Manitoba and other Dominion mills. On the last day of November, 264,000 sacks of flour were on passage. America shipped 653,000 sacks in November, but Hungary and Australia very little.

Barley.—In the last week of November, English barley showed the great variation of 9s. 1d. between 31s. 1d. at Canterbury, and 22s. at Bridlington. More usual mean values were 27s. 6d. at Chelmsford and 28s. 3d. at Reading. The demand for home-grown barley was steadily increasing all through the month, and before November closed, was decidedly good. The quality, while seldom satisfying maltsters, is not hopelessly bad, except in the most belated regions; these, however, have included this year districts as far south as Essex, where barley was still being carted in mid-November. The thrashings in Norfolk and elsewhere often reveal 36 to 42 bushels per acre, but the extent to which the grain is weather-stained is of course a serious drawback. Foreign barley has made 32s. 6d. to 34s. 6d. for Chilian, 33s. to 33s. 6d. for Californian per 448 lb., the very choicest Moravian touching 43s. per 456 lb. Russian barley picked up a penny per cental on the month; opening at 5s., and closing at 5s. 1d.; the Russian shipments,

1,871,000 qrs., were very heavy, but the Continent took a larger proportion than usual. On the 30th there were 675,000 qrs. on passage to the United Kingdom, of which total 310,000 qrs. were Russian, 280,000 qrs. Californian, and 70,000 qrs. Anatolian. The remaining 15,000 qrs. were Chilian, Roumanian, Turkish, and Burmese. No Canadian or Persian barley is in evidence on our markets at present.

Oats.—Peterborough, a very low price centre for oats, closed October at 16s. 2d., and November at 16s. 9d. per qr. This is a hopeful sign, but late November quotations of 16s. 4d. at Cambridge, 16s. 8d. at Lincoln, 16s. 9d. at Norwich and 16s. 11d. at Berwick, argue that much 1909 produce will not be fed for any higher purpose than as a rough grist for cattle, ranking, indeed, but little above the oat straw commonly chaffed for the same purpose. A large yield per acre is needed to make 16s. 4d. or even 16s. 11d. per qr. profitable. The imported oats which have been pouring in from Russia, tended in later November to overwhelm Mark Lane, where, on the 29th, 164,000 qrs. were newly tendered, and sellers at 15s. per 504 lb. had little custom. Roumania, on the 27th, shipped 51,000 qrs. at 14s. 6d. to 14s. 9d. Turkish oats are offering at very low prices, and Argentina, with a crop ripening in early January, is pressing late January and early February shipments at 14s. 6d. per 304 lb. f.a.q. direct from London. The market for light oats seems to be assured of low prices for some months ahead. November shipments were 990,000 qrs. from Russia and 110,000 qrs. from all other countries. There were on the 30th, 340,000 qrs. on passage to the United Kingdom.

Maize.—A very level rate of imports has been maintained for two months. Only 430,000 qrs. were on passage on the 30th, and prices varied in London very little from a mean of 26s. per 480 lb. Liverpool has a far larger choice, and ranged on the 30th from 5s. 6d. per cental for Burmese to 6s. 7d. for finest C'inquantina. Probably, however, 90 per cent. of the whole business passing was in Russian round at 5s. 7d., Natal flat at 5s. 10d., La Plata yellow at 5s. 7d., and old American at 5s. 11d. per cental. On the last day of November, the spot price for maize at New York was 68 cents. per bushel, against 72 cents. in 1908, and 66 cents. in 1907. The price at which America offers to ship new maize, properly dried for use, in January, is 25s. 3d. per 480 lb. to London, and 5s. 3d. per 100 lb. to Liverpool.

Pulse.—The finest hand-picked blue peas command £5 per 532 lb. but the picking accounts for £1 of this. New Dun peas are in increased offer at 34s per 504 lb. The market for English beans is poor, as they are mostly too soft for splitting. A good trade, however, was done during November in Japanese beans at £7 10s. per ton for Sakura, £7 for ordinary. Tares at 8s. to 8s. 6d. per bushel rather hung on hand.

Oilseeds.—Excitement marked some of the November markets for oilseeds, and though a more quiet feeling ruled from the 23rd to the 30th, prices were decidedly high. Good Indian, American, and Russian linseed on the last day of the month was held for 58s. per qr., and Argentine, which was in fullest supply, made 56s. Rapeseed ranged from 32s. for Joruba, to 62s. per qr. for English. Cottonseed from Egypt was held for 8s. 6d. to 8s. 9d. per cwt. Other oilseeds offered were Sesame at 49s. to 51s. per 384 lb., and Poppyseed at 53s. to 54s. per qr. On the last of the month, there were on passage 70,000 qrs. of linseed,

15,000 qrs of rapeseed, and 50,000 tons of cottonseed. November shipments of linseed were 93,000 qrs. from Argentina, and 69,000 qrs. from India.

Farm Seeds.—The new crop of home cloverseed is a sad wreck, and 90s. per cwt. was paid during November at Mark Lane, Wisbech, and Peterborough, for fine quality secured in good condition. The market, for the most part, has had to rely upon foreign cloverseed, which, at 66s. to 68s. for red, and 58s. to 64s. for white, includes really serviceable samples. Other November sales on this market have been of Lucerne at 78s. to 88s., Sainfoin at 28s. to 30s., Trefoil, at 50s. to 70s., Alsike at 80s. to 84s., and Cowgrass at 90s. to 92s. (all per cwt.) Perennial ryegrass has made £2 per 224 lb.

Minor Staples.—Rye at 28s. to 29s. per 480 lb. for new English is cheap and good value; it was nearly all harvested before the weather of August broke up. Manchurian millet at 23s. per 416 lb. was quickly bought and sales were also brisk during the month for Russian buckwheat at 28s. 6d. per 416 lb., and for Indian dari at 26s. 6d. per 480 lb. The by-products of the mill had an increasing sale as November drew to its close.

THE LIVE AND DEAD MEAT TRADE IN NOVEMBER.

A. T. MATTHEWS.

Fat Cattle.—The month began with a very large supply at Islington on the 1st. Large, that is, for these days, for the 1,570 head would have been considered a remarkably small lot a few years ago. It was the largest market since Christmas, but, fortunately for the sellers, there was a good attendance of buyers who had contracts to fulfil, and all were cleared at the full prices of the previous week. The trade generally was firm in tone. The average for Shorthorns in 22 markets was 8s. per stone for first, and 7s. 2½d. for second quality; for Herefords, 8s. 4½d. and 7s. 8½d.; for Devons, 8s. 5½d. and 7s. 5½d.; Runts, 8s. and 7s. 4½d.; and Scots, 8s. 0½d. These prices showed some advance on the last week of October for Devons and Welsh Runts. The highest average price for Shorthorns was 8s. 9d. for stall-feds at Ipswich, and the lowest 7s. 7d. at Liverpool, London being well above the average of the English markets at 8s. 2d. In the second week this breed was not nearly so well shown in London, and the quotation was relatively reduced, although the trade continued good for the time of the year, and considering the condition of the animals offered. The average for Shorthorns, in fact, was a trifle higher on the week, but Devons were slightly lower owing to the falling off in condition, while Runts came out better and improved their average by ½d. per stone for first quality. The demand for Shorthorns was considerably better at Bristol, Leicester and Peterborough. In the third week, stall-fed cattle began to appear in several markets, and these, of course, met with much appreciation. Where they were absent, however, even those described as first quality were very unfinished, and

so the general average of Shorthorns was not materially higher, that of first quality being 8s. 0½d. and second, 7s. 3½d. Prices were higher at Derby, Hull, Newcastle, Norwich, Peterborough and Wakefield. This tendency for the averages of first and second quality more nearly to approach each other was more marked with Herefords, first quality declining 1d. per stone, and second advancing ½d. They were 8s. 4d. and 7s. 9½d. respectively. Devons showed an advance of 1½d. per stone on first, and 1½d. on second quality, which then stood at 8s. 6d. and 7s. 8d. Welsh Runts, with very little change, averaged 8s. 1d. and 7s. 3½d., and Polled Scots 8s. 2½d. and 7s. 3½d.

At the Metropolitan Cattle Market on the 22nd, there was a striking object lesson to graziers who send stock to market in immature condition. The supply consisted of 1,280 head, made up of Shorthorns and Welsh Runts, with a sprinkling of Devons and Herefords. There was a good steady demand, but prices of grass-fed beasts were no higher than those of the previous week. For two weeks in succession, Shorthorns had not exceeded 6½d. per lb. or 7s. 10d. per 14lb. stone, and this would again have been their top quotation had it not been for the appearance of a score or so of stall-fed Norfolks. These were quickly disposed of at 7½d. per lb. This means ¾d. per lb., or about 30s. per head, simply for *quality*, while it is generally acknowledged that the increase in *weight* more than covers the cost of feeding and other expenses.

The last week saw a decided improvement in the demand for fat cattle, and even cows looking like yielding suet sold better, which is generally the first sign of the Christmas trade. The average price of first quality Shorthorns in English markets went up 2d. per stone, but second quality was unchanged. In over 20 markets the averages were 8s. 2d. and 7s. 3½d.

The markets actually higher for prime Shorthorns were Bristol, Derby, Ipswich, Leeds, Leicester, Lincoln, London, Nottingham and Peterborough. Wakefield was the only English market quoted lower. There was only a very trifling change in the average values of either of the other breeds, and this points to the increased value of Shorthorns being caused by their improvement in condition, the average (in other words) being raised by the coming out of stall-fed bullocks in many places. Trade in Scotland was firm generally, and 43s. 3d. per live cwt. was realised at Edinburgh.

Veal Calves.—In about twenty markets calves remained without any change in the values current in October, viz. :—8d. per lb. for first and 7d. for second quality, but, although the demand was small, supplies fell off, and really good calves became scarce, and, after the second week prices advanced from ½d. to ¾d. per lb.

Fat Sheep.—The leading feature of the first week was a very considerable increase in the number of sheep exposed for sale, compared with that at the corresponding markets last year. Although the supplies at Islington continued moderate, in the country generally they exceeded those of 1908 by about 20 per cent. At Salford they were 11,300 against 8,500, and at Glasgow, 11,400 against 7,900. Taken in conjunction with the very large increase in the importations of frozen mutton, this heavy supply goes far to account for the prevailing cheap-

ness. Last year at this time Down sheep were fetching about 1d. per lb. more than they are now doing, and, going back another year, we find the fall to be nearly 2d. per lb., or about 10s. per head on sheep of handy weights. It has been remarked that sheep are not being so well fed as usual, and this is attributed to the discouragement of farmers by the long-continued low prices which fail to repay the cost of fattening. During the first week, in nineteen markets, Downs averaged 7½d. for first, and 6½d. for second quality, showing no change from the last week in October. The average for Longwools was 6½d. per lb. for first and 6d. for second quality, while ewes averaged 4½d. Young Down tegs made 8d. per lb. at London, Ipswich and Chichester.

The second week brought very little change in the trade, but that little was in sellers' favour. Prime Downs still averaged 7½d. per lb., but there was an advance of ¼d. in second quality. In the case of Longwools, first quality was again quoted at an average of 6½d. The highest quotation even for young Down tegs was 7½d. per lb. There was no improvement whatever in the third week, indeed the advance of ¼d. per lb. on second quality was lost. The last week brought no change in the average price of Downs. The character of the reports was, however, more chequered, and reports from Hull, Leeds, Liverpool, Norwich, Preston, Salford, Shrewsbury, Wolverhampton and York were all couched in a more cheerful tone. Notably at Shrewsbury it was stated that the best wethers advanced about 5s. per head. At Derby the price advanced ¼d. per lb. for prime Downs, which place stood alone in quoting them as high as 8d. per lb. Cheviots were quoted in eleven markets, and the average of first quality was 7½d.—the same as that for Downs. The Black-faced Mountain breed first quality averaged 6½d. "Cross-Breds" were quoted in thirty-one markets, but these include varieties differing widely in character. Still their average was only a small fraction lower than that of the Downs or Cheviots.

Fat Pigs.—All through the month the trade for pigs was excellent. There was an advance on October prices in the first week, and prime small pigs averaged 7s. 6d. per stone, and second quality 6s. 11d. The second week there was no diminution in the demand, but prices were stationary. They again moved upwards in the third week, both firsts and seconds advancing 1½d. per stone on the average of thirty-one British markets. In the last week the trade might almost be described as excited. Supplies fell short of demand almost everywhere, and the average for first quality in thirty markets went up to 7s. 8d., and that of second in twenty-six markets to 7s. 1½d. per 14 lb. In Birmingham, first quality bacon pigs touched 7s. 11d., and porkers sold as high as 8s. 9d. per stone.

Carcass Beef.—Scotch beef maintained even values throughout the month in London market for both short and long sides, the former being steadily quoted at 7½d. to 7d., and the latter at 6½d. to 6¼d. per lb. English sides were of poor quality and only second was quoted during the month. It seems scarcely credible that only occasionally is any prime English beef seen in Smithfield market, but such is undoubtedly the fact. Unlike the Scotch, which is consigned in train loads, and includes some carcasses of unsurpassed quality, the best English passes

to the consumer through other channels. Butchers buy at Islington and dispose of the meat from their shops, and only the inferior, which is not good enough for their trade, is sent to Smithfield for disposal. It is evident to all who are acquainted with the subject that a fine English bullock is worth within $\frac{1}{4}d.$ per lb. of the finest Scotch, and is certainly fully equal to the best port-killed American. Yet in the first week of November, Scotch sides were selling at $6\frac{1}{4}d.$, port-killed at $5\frac{3}{4}d.$, and English at $5\frac{1}{2}d.$ as top value, the fact being that at the same time, had there been any prime English carcasses, they would have made at least $6d.$ per lb. For the credit of English breeders and feeders, it ought to be clearly understood that English beef is not fairly represented on the Central Market. Anomalies, however, are very common at Smithfield, and prices are not always ruled by the intrinsic worth of the various supplies. For instance, in the first week of November, frozen hind quarters were only making $\frac{1}{4}d.$ per lb. more than fore quarters, the one fetching $3\frac{1}{2}d.$ and the other $3\frac{1}{4}d.$ per lb., simply because the latter were in short supply.

The most interesting event of the month, however, was the arrival of the first cargo of chilled beef from Queensland, which caused considerable excitement in the trade, and much anxiety as to the result in Australia. This first experiment was a success so far as the condition of the meat was concerned, and much of it was sold at $\frac{3}{4}d.$ per lb. more than the best Argentine offering the same day, though, of course, not approaching the price of United States chilled. While this chilled Australian was making up to $4\frac{7}{8}d.$ per lb., frozen from the same source was only fetching $3\frac{1}{2}d.$ and this solid result must prove very encouraging to the new enterprise, and will perhaps largely stimulate beef production in the Commonwealth.

Carcass Veal.—The veal supplies were light throughout, but the demand was not great. This article is not largely consumed at this time of year, and November was colder than usual, still further checking requirements. Yet more or less business is done in veal at all times, and the scarcity of really good quality was so marked that the price of best English advanced from $6\frac{1}{4}d.$ at the beginning to $7\frac{1}{2}d.$ at the end of the month, and as much as $8d.$ per lb. was obtainable for exceptionally fine carcasses.

Carcass Mutton.—The hopes that were entertained in October in many quarters of at least some improvement in prices in consequence of the sudden and quite unexpected advance in frozen mutton, were doomed to disappointment. That movement was not founded on any falling off in supplies or the stocks in cold storage, which are known to have been very large, and it was doubted from the first if owners would be able to maintain their position. The highest point touched for New Zealand of best quality was $5d.$ per lb. and $4\frac{1}{2}d.$ for Australian. This was in the middle of October, and prices gradually declined till, at the end of November, New Zealand was only fetching $3\frac{3}{4}d.$ to $4d.$, and Australian and Argentine best about $3\frac{1}{4}d.$ This is still considerably above the low level prevailing before the rise, but frozen mutton is again far too cheap to give much hope of any substantial advance in fresh killed. During the month, there was very little variation in the value of Scotch and English. The former has ranged between $5\frac{1}{4}d.$ and

6½d. for prime small sheep, a few weighing only 44 lb. occasionally touching 6½d. No English has been worth more than 6d. in the London dead-meat market, and the very best has been as low as 5½d. per lb.

Pork.—The constant supply of Dutch arriving in the port of London moderates values at Smithfield, where prices have been lower than in Midland markets. London values have been very steady all the month, prime small English fetching from 7½d. to 7¾d. per lb.

THE PROVISION TRADE IN NOVEMBER.

HEDLEY STEVENS.

Bacon.—The abnormal conditions in this trade still continue, and on account of the extreme scarcity, and consequent high prices, both wholesale and retail dealers find it most difficult to make a profit; but the producers of the raw material must be realising handsome profits.

The London market has been receiving smaller consignments of both Danish and Dutch, for which a ready outlet has been found at from 2s to 4s. per cwt. advance on the month. There have been complaints as to the quality of the recent arrivals of Danish, which increased the London demand for Irish sides.

During the latter half of the month arrivals from the United States of America were a little freer, which somewhat checked the further advances which had been established earlier in the month. The receipts of hogs at all American packing-house centres have increased, but are still considerably below last year's quantities. Packers have been free buyers, paying up to \$8.20, against \$6.15, the top figure for the corresponding month last year, and \$5.30 in 1907. The latest cable advices report that there is no accumulation of stock, and all meats are required as soon as cured, the home consumption being good.

Canada is sending us a little more bacon. At the end of the month a shipment reached Liverpool from a packing house which had been closed for the previous seven months: this points, of course, to more hogs being available. Their home trade continues good.

Further experiments are being made in shipping carcasses in steamer refrigerators from Australia, to be cured on arrival in England. We are also receiving small experimental consignments of cured bacon from Mexico.

Throughout the month English and Irish bacon was in good demand. The curers still complain of the continued difficulty in obtaining sufficient pigs to fill their requirements.

Cheese.—The demand has again been disappointingly slow for all traders. Although prices are lower than last year, the retailer seems determined to buy only as required; also, as is usual during the month of November, the grocer is inclined to give more attention to the buying of Christmas specialities. Where merchants found it necessary to cut prices to force business, they have done it on the summer-made lots, as they preferred to hold the autumn makes for an improved market.

At the end of the month the estimated stocks at the three principal distributing centres (London, Liverpool, and Bristol) were 419,000, against 397,000 last year and 386,000 two years ago.

Very little business has passed with Canada during the month, although lower prices were quoted with a view to force business before the close of navigation of the St. Lawrence, and so save the increased freight. Up to the middle of November the shipments from Montreal for the season amounted to 1,789,711 boxes, which is about 93,000 in excess of last year. The receipts into Montreal were about 39,000 in excess for the same period, which points to smaller stocks being held at that port for shipment during the winter months. A large number of factories discontinued cheese-making early in the month. Favourable advices are still being received as to the make of cheese in New Zealand, although recent shipments have not shown so great an increase over last year's figures as early this season. In the United States, best selections of cheese are realising prices equal to 78s.-80s. c.i.f.

The trade in English cheese has been good, but recent sales at some country markets have been at lower figures for the inferior late makes; Cheshire markets show a rise of 5s. on the month.

Butter.—There is no special feature to report. The demand has been steady throughout the month, with prices slightly advanced. At the end of the month American refined lard was making 72s. per cwt., which makes butter proportionately very cheap. Arrivals from the Colonies were large, buyers giving these fresh goods the preference. The make is large both in Australia and New Zealand. It is reported from the former country that there is not sufficient freight room to carry the quantity tendered for shipment each week. Practically nothing is now being shipped to England from Canada. The total season's shipments were only 39,500 packages, against 93,000 last year.

The *Montreal Trade Bulletin* for November 19th reports:—"The consensus of opinion in the trade is that butter is all right, with prices $2\frac{1}{2}$ cents to 3 cents per lb. under those of last year. The receipts now only about cover local requirements, and will soon fall considerably below them, necessitating a demand for the finest September and other stored goods. A few shipments have already gone forward to the Lower provinces: Ottawa, Winnipeg, and Vancouver, and the intermediate points both East and West. There is not as much cream going across the border as there was a few weeks ago, as prices on the other side of the line have been cut down since the drop in the price of butter. This, it is thought, may increase the supply of butter here; but even if it should, it is expected there will be no surplus in the spring."

In the United States of America, butter continues to demand extravagant prices, equal to 154s. per cwt. being paid for best selections. Renovated lots are realising around 135s. per cwt.

As usual at this time of year, there is not much Irish offering, and prices have advanced, the demand being chiefly for best goods, which are scarce.

Eggs.—English were extremely scarce and dear during the month. A good trade was done in preserved, both Irish and foreign, at steadily advancing prices.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and SCOTLAND
in the Month of November, 1909.

(Compiled from Reports received from the Board's Market
Reporters.)

Description.	ENGLAND.		SCOTLAND.	
	First Quality.	Second Quality.	First Quality.	Second Quality.
FAT STOCK:—	per stone.*	per stone.*	per cwt.†	per cwt.†
Cattle:—	s. d.	s. d.	s. d.	s. d.
Polled Scots	8 2	7 8	40 11	36 4
Herefords	8 4	7 9	—	—
Shorthorns	8 0	7 3	39 9	35 11
Devons	8 5	7 7	—	—
	per lb.*	per lb.*	per lb.*	per lb.*
	d.	d.	d.	d.
Veal Calves	8	7½	8½	7
Sheep:—				
Downs	7½	6½	—	—
Longwools	6½	6	—	—
Cheviots	7½	6½	7½	6½
Blackfaced	6½	5½	6½	5½
Cross-breds	7	6½	7½	6½
	per stone.*	per stone.*	per stone.*	per stone.*
	s. d.	s. d.	s. d.	s. d.
Pigs:—				
Bacon Pigs	7 7	7 2	7 6	6 7
Porkers	8 1	7 8	7 8	6 10
LEAN STOCK:—	per head.	per head.	per head.	per head.
Milking Cows:—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk ...	22 3	18 6	21 11	17 18
„ —Calvers	21 10	18 3	20 5	17 6
Other Breeds—In Milk ...	22 12	15 2	19 11	16 3
„ —Calvers	16 0	—	19 16	16 8
Calves for Rearing	2 3	1 13	2 9	1 13
Store Cattle:—				
Shorthorns—Yearlings ...	9 13	8 2	10 7	8 8
„ —Two-year-olds ..	13 18	12 5	15 3	12 13
„ —Three-year-olds ...	16 13	15 2	17 5	14 0
Polled Scots—Two-year-olds	—	—	14 1	12 13
Herefords— „	15 2	13 14	—	—
Devons— „	14 6	12 2	—	—
Store Sheep:—				
Hoggs, Hoggets, Togs, and Lambs—	s. d.	s. d.	s. d.	s. d.
Downs or Longwools ...	30 10	24 8	—	—
Scotch Cross-breds ...	—	—	22 2	17 0
Store Pigs:—				
Under 4 months	26 3	19 4	20 5	18 3

* Estimated carcass weight.

† Live weight.

AVERAGE PRICES of DEAD MEAT at certain MARKETS in
ENGLAND and SCOTLAND in the Month of November, 1909.

(Compiled from Reports received from the Board's Market
Reporters.)

Description	Quality.	London.	Birming- ham.	Man- chester.	Liver- pool.	Glas- gow.	Edin- burgh.
		per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.
BEEF :—							
English	1st	—	51 0	49 0	—	60 0*	55 6*
	2nd	52 0	47 6	46 6	—	55 0*	48 0*
Cow and Bull ..	1st	41 6	44 6	43 6	41 0	44 6	40 0
	2nd	32 6	40 0	38 6	36 0	32 6	34 0
U.S.A. and Cana- dian :—							
Port Killed ...	1st	54 0	49 6	—	49 6	50 0	—
	2nd	45 6	44 6	46 0	44 6	44 6	50 0
Argentine Frozen—							
Hind Quarters...	1st	32 6	35 0	33 0	33 0	31 6	33 0
Fore " ...	1st	29 0	30 6	30 6	29 6	28 6	30 0
Argentine Chilled—							
Hind Quarters .	1st	43 6	45 0	45 6	45 0	42 0	43 0
Fore " ...	1st	31 0	33 0	32 0	32 0	31 6	30 6
American Chilled—							
Hind Quarters—	1st	60 0	60 6	60 0	60 0	—	61 0
Fore " ...	1st	36 6	37 6	36 6	36 6	—	38 6
VEAL :—							
British	1st	68 6	56 6	71 0	71 6	—	—
	2nd	63 6	50 6	65 6	67 0	—	—
Foreign	1st	66 6	—	—	—	—	66 6
MUTTON :—							
Scotch	1st	56 6	—	59 0	59 0	57 6	50 0
	2nd	52 6	—	54 0	54 0	39 6	38 6
English	1st	52 6	57 0	53 0	53 6	—	—
	2nd	49 0	50 6	48 6	47 0	—	—
U.S.A. and Cana- dian :—							
Port Killed ...	1st	—	—	—	—	—	—
Argentine Frozen ...	1st	35 6	36 6	35 6	36 6	32 6	36 0
Australian " ..	1st	34 6	35 6	34 0	34 6	32 6	—
New Zealand " ..	1st	40 0	—	43 6	39 6	—	—
LAMB :—							
British	1st	—	—	—	—	—	—
	2nd	—	—	—	—	—	—
New Zealand ...	1st	43 0	46 0	43 0	43 0	47 0	49 0
Australian ...	1st	37 0	39 6	39 6	40 6	34 6	—
Argentine	1st	38 0	42 0	—	—	34 6	—
PORK :—							
British	1st	69 0	71 0	72 6	72 6	61 0	63 0
	2nd	63 6	66 0	66 6	65 6	59 0	55 6
Foreign	1st	67 6	—	—	—	—	—

Scotch.

AVERAGE PRICES of **British Corn** per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1907, 1908 and 1909.

Weeks ended (<i>in</i> 1909).	WHEAT.						BARLEY.						OATS.					
	1907.		1908.		1909.		1907.		1908.		1909.		1907.		1908.		1909.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Jan. 2 ...	26	0	35	1	32	0	23	11	26	9	26	7	17	3	18	4	17	4
" 9 ...	26	1	35	2	32	9	24	2	26	9	26	11	17	4	18	3	17	5
" 16 ...	26	1	35	5	32	8	24	1	27	1	27	1	17	5	18	5	17	5
" 23 ...	26	2	35	6	33	2	24	5	26	11	27	3	17	5	18	5	17	8
" 30 ...	26	3	35	0	33	0	24	4	26	11	27	6	17	5	18	4	17	9
Feb. 6 ...	26	6	34	3	33	4	24	5	26	9	27	7	17	7	18	3	17	10
" 13 ...	26	7	33	1	33	8	24	1	26	9	27	8	17	7	18	0	17	11
" 20 ...	26	10	32	6	34	1	24	2	26	5	27	11	17	9	17	11	18	0
" 27 ...	26	9	30	11	34	5	24	2	26	3	28	0	17	9	17	-8	18	0
Mar. 6 ...	26	8	30	5	34	10	23	11	26	1	27	11	17	11	17	8	18	2
" 13 ...	26	10	31	3	35	8	24	2	26	0	28	4	18	0	17	10	18	2
" 20 ...	26	10	31	7	35	9	24	0	26	2	28	0	18	1	17	11	18	5
" 27 ...	26	8	31	4	36	0	23	9	25	10	28	0	18	2	17	10	18	6
Apl. 3 ...	26	9	31	3	36	5	24	3	25	5	27	10	18	3	17	9	18	8
" 10 ...	26	8	31	2	37	4	23	9	25	10	28	0	18	6	17	7	18	10
" 17 ...	26	8	30	11	38	7	23	3	26	1	27	8	18	7	17	7	19	2
" 24 ...	26	10	30	10	41	4	23	3	25	5	28	2	18	9	17	9	19	9
May 1 ...	27	0	31	6	42	5	23	6	25	8	27	10	19	3	18	0	20	0
" 8 ...	27	6	32	4	40	9	24	0	25	5	27	7	19	7	18	4	20	3
" 15 ...	28	4	33	1	41	6	23	10	24	9	27	3	20	1	18	7	20	6
" 22 ...	29	7	33	8	42	8	24	3	25	9	27	0	20	5	18	10	20	11
" 29 ...	31	0	33	5	42	6	24	0	24	6	26	3	20	8	18	8	21	0
June 5 ...	32	0	33	1	43	1	24	7	25	10	25	7	20	7	18	4	21	3
" 12 ...	31	10	32	7	42	11	24	7	24	5	26	10	20	11	18	4	21	4
" 19 ...	31	4	32	0	42	7	24	11	24	2	26	10	20	9	18	5	21	6
" 26 ...	31	2	31	5	42	8	24	6	24	0	27	2	20	8	18	7	21	7
July 3 ...	31	3	30	11	42	9	24	8	23	11	27	2	20	11	18	7	21	9
" 10 ...	32	0	30	5	43	0	24	10	24	4	26	4	20	11	18	5	21	8
" 17 ...	32	6	30	7	43	3	24	6	23	1	26	10	21	1	18	5	21	9
" 24 ...	32	11	31	5	44	0	27	3	26	5	27	4	20	8	18	6	22	5
" 31 ...	33	2	31	10	43	5	26	4	24	4	24	6	21	2	18	7	22	2
Aug. 7 ...	33	5	31	6	44	9	26	6	23	1	27	4	21	3	18	9	22	11
" 14 ...	33	6	31	6	44	9	25	9	23	10	24	9	20	4	18	1	21	8
" 21 ...	33	7	31	2	41	6	25	0	24	5	23	11	19	8	17	10	19	8
" 28 ...	33	10	30	10	38	5	24	6	24	5	24	7	18	11	17	1	19	4
Sept. 4 ...	31	11	30	10	37	2	24	2	25	5	26	3	17	7	17	3	19	6
" 11 ...	31	4	31	5	34	11	24	4	25	11	26	1	17	6	17	6	18	5
" 18 ...	31	5	31	7	33	6	25	0	26	0	26	5	17	6	17	3	17	9
" 25 ...	31	8	31	5	32	9	25	3	26	8	26	8	17	8	17	2	17	7
Oct. 2 ...	32	6	31	7	32	2	25	5	26	11	26	9	17	9	17	2	17	2
" 9 ...	33	3	31	5	31	8	25	9	27	5	26	9	17	11	17	0	17	0
" 16 ...	34	4	31	2	31	4	26	3	27	6	27	0	18	0	17	0	17	0
" 23 ...	35	9	30	11	31	8	27	2	27	5	27	7	18	7	16	11	16	11
" 30 ...	36	3	30	8	31	10	27	7	27	5	27	9	18	10	16	11	17	0
Nov. 6 ...	35	10	30	11	32	5	27	8	27	6	27	9	18	10	17	0	17	0
" 13 ...	35	1	31	2	32	5	27	8	27	4	27	7	18	8	17	0	17	1
" 20 ...	34	7	31	20	32	7	27	5	27	3	27	0	18	9	17	3	17	4
" 27 ...	34	7	32	3	33	0	27	5	27	2	26	8	18	7	17	5	17	3
Dec. 4 ...	34	7	32	7	33	3	27	1	27	2	26	1	18	6	17	4	17	4
" 11 ...	34	8	32	8			27	0	27	0			18	5	17	4		
" 18 ...	34	9	32	9			27	1	26	9			18	3	17	3		
" 25 ...	34	6	32	2			26	10	26	8			18	0	17	2		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lbs.; Barley, 50 lbs.; Oats, 39 lbs. per Imperial Bushel.

AVERAGE PRICES of Wheat, Barley, and Oats per Imperial Quarter in FRANCE, BELGIUM, and GERMANY, and at PARIS, BERLIN, and Breslau.

	WHEAT.		BARLEY.		OATS.	
	1908.	1909.	1908.	1909.	1908.	1909.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
France : October	38 8	39 6	25 11	25 4	20 1	20 3
November	38 4	39 7	25 9	25 4	20 0	20 4
Paris : October	39 2	40 6	26 2	24 8	20 8	19 5
November	39 4	40 3	25 0	24 8	20 10	19 8
Belgium : September	34 3	35 6	24 9	24 3	19 7	20 5
October	34 3	35 11	25 3	24 2	19 11	19 5
Germany : September	42 1	44 1	29 10	27 3	21 9	21 6
October	42 1	44 1	31 1	27 6	22 2	21 2
Berlin : September	44 3	45 8	—	—	22 9	21 10
October	43 10	47 2	—	—	22 11	21 3
Breslau : September	40 11	43 10	30 8 (brewing)	28 8 (brewing)	20 10	26 5
			26 0 (other)	25 1 (other)		
October	41 3	44 10	30 8 (brewing)	27 2 (brewing)	21 1	20 4
			26 0 (other)	25 1 (other)		

NOTE.—The prices of grain in France have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*; the Belgian quotations are the official monthly averages published in the *Moniteur Belge*; the German quotations are taken from the *Deutscher Reichsanzeiger*, the prices for the German Empire representing the average of the prices at a number of markets.

AVERAGE PRICES of British Wheat, Barley, and Oats at certain Markets during the Month of November, 1908 and 1909.

	WHEAT.		BARLEY.		OATS.	
	1908.	1909.	1908.	1909.	1908.	1909.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
London	33 1	33 5	27 5	26 2	18 3	18 1
Norwich	30 11	32 7	27 3	25 7	16 11	16 8
Peterborough	31 2	32 1	27 5	28 4	17 2	16 6
Lincoln	30 11	31 6	27 1	28 4	16 11	17 0
Doncaster	30 8	31 0	27 0	27 0	17 1	17 2
Salisbury	31 5	33 5	27 6	27 9	17 5	17 5

AVERAGE PRICES of PROVISIONS, POTATOES, and HAY at certain
MARKETS in ENGLAND and SCOTLAND in the Month of
November, 1909.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	London.		Bristol.		Liverpool.		Glasgow.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
BUTTER :—	per 12 lb	per 12 lb.	per 12 lb	per 12 lb	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb
British ..	15 9	14 0	15 0	14 0	—	—	15 0	—
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery	120 0	116 0	123 0	115 0	121 6	118 0	123 6	—
„ Factory	107 6	103 6	104 0	98 0	103 0	96 0	—	—
Danish ..	131 0	128 6	—	—	131 6	128 6	130 6	—
Russian ..	110 0	106 0	111 0	99 6	108 0	105 0	111 6	106 6
Canadian	—	—	118 0	112 0	—	—	118 0	—
Australian	117 0	115 0	115 6	102 6	117 6	115 0	119 6	116 0
New Zealand	119 0	117 0	123 0	112 6	121 0	118 6	122 0	—
CHEESE :—								
British—								
Cheddar .	82 0	72 6	74 0	60 0	75 6	70 0	65 0	59 0
	120 lb	120 lb.	—	—	120 lb.	120 lb	—	—
Cheshire	83 6	72 0	—	—	74 6	67 6	—	—
	per cwt	per cwt.	—	—	per cwt	per cwt	—	—
Canadian	58 0	56 6	58 0	56 0	58 0	55 6	58 0	55 0
BACON :—								
Irish ..	73 6	71 0	73 6	70 0	71 6	68 6	74 6	72 0
Canadian ..	69 0	68 0	69 0	68 0	68 6	66 6	—	—
HAMS :—								
Cumberland ...	110 6	98 6	—	—	—	—	—	—
Irish ..	107 0	98 0	—	—	—	—	93 0	82 6
American (long cut)	66 6	65 6	69 0	66 0	68 6	63 0	68 0	65 0
EGGS :—	per 120	per 120	per 120	per 120	per 120.	per 120.	per 120.	per 120.
British ..	19 4	17 11	16 5	—	—	—	—	—
Irish ...	16 0	15 6	15 3	14 8	15 3	13 9	14 10	13 3
Danish ...	16 6	13 10	—	—	14 10	13 9	14 3	12 10
POTATOES :—	per ton	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Langworthy.	80 0	70 0	71 0	64 0	78 6	68 6	50 0	45 0
Scottish								
Triumph	68 6	57 6	63 6	53 6	50 0	45 0	—	—
Up to Date	70 0	57 6	68 6	57 6	50 0	45 0	45 0	40 0
HAY :—								
Clover	102 0	78 0	85 0	70 0	98 0	65 0	78 0	72 0
Meadow	94 0	72 0	75 0	60 0	—	—	—	—

DISEASES OF ANIMALS ACTS, 1894 to 1903.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

DISEASE.	NOVEMBER.		ELEVEN MONTHS ENDED NOVEMBER.	
	1909.	1908.	1909.	1908.
Swine-Fever :—				
Outbreaks	114	173	1,546	1,935
Swine Slaughtered as diseased or exposed to infection ..	730	1,821	13,591	*12,704
Anthrax :—				
Outbreaks	102	93	1,201	1,013
Animals attacked	117	105	1,556	1,315
Foot-and-Mouth Disease :—				
Outbreaks	—	—	—	3
Animals attacked	—	—	—	112
Glanders (including Farcy) :—				
Outbreaks	49	48	513	741
Animals attacked	91	164	1,710	2,315
Sheep-Scab :—				
Outbreaks	63	69	561	732

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

DISEASE.	NOVEMBER.		ELEVEN MONTHS ENDED NOVEMBER.	
	1909.	1908.	1909.	1908.
Swine-Fever :—				
Outbreaks	1	3	87	155
Swine Slaughtered as diseased or exposed to infection ...	1	29	1,562	3,563
Anthrax :—				
Outbreaks	—	—	8	7
Animals attacked	—	—	8	10
Sheep-Scab :				
Outbreaks	43	31	373	331

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 The Development of the Grain of Wheat, *W. E. Brenchley* and *A. D. Hall*. (Jour. Agr. Sci., Vol. III., Pt. 2.)
 Die Beetkultur des Getreides, *Dr. Fruwirth*. (Fuhlings Landw. Ztg., Vol. 58, No. 21.)

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Aberdeen and North of Scotland College of Agriculture, Bulletins, Leaflets and Reports.

Agricultural Organisation Society, Annual Report.

Armstrong College, Newcastle-on-Tyne, Bulletins and Reports.

Bath and West and Southern Counties Society, Journal.

Board of Education :—

Return, Higher Education, England and Wales (Application of Funds by Local Authorities)

Special Reports on Agricultural Subjects.

Statistics of Public Education in England and Wales

Board of Trade :—

Annual Statement of the Trade of the United Kingdom.

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Principal and Other Foreign Countries.

United Kingdom.

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British Rainfall.

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Commissioners of his Majesty's Inland Revenue, Report.

Country Gentlemen's Estate Book.

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Highland and Agricultural Society of Scotland, Transactions.

Horse Breeding, Royal Commission, Report.

Local Government Board :—

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Local Taxation Account.

„ „ Returns.

Reports on Public Health and Medical Subjects.

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Meteorological Council, Report.

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University of Cambridge, Reports and Bulletins.

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ADDITIONS TO THE LIBRARY.

[NOTE.—The receipt of *annual* publications of foreign agricultural and other departments, experiment stations, and societies is not noted in the monthly list of additions to the Library. A list of all these publications received appeared in the *Journal* for October and November, 1909, and is concluded on p. 789.]

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THE JOURNAL

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THE MAKING AND APPLICATION OF BORDEAUX MIXTURE.

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I. *The Making of Bordeaux Mixture.*—Directions as to the best method of making Bordeaux mixture have already been given in this *Journal*.* In order, however, to make the present article more complete, these are here repeated.

Bordeaux mixture for spraying fruit-trees generally (excluding peaches) should be made according to the following formula and in the following manner:—

Copper sulphate ("bluestone") †	4 lb.
Quicklime (in lumps)	4 lb.
Water	50 gallons. ‡

Dissolve the 4 lb. of copper sulphate in a wooden tub or bucket—*iron or tin vessels must not be used*. The easiest way to do this is to suspend the material, wrapped in a piece of

* Vol. xv, p. 191 (1908).

† In purchasing copper sulphate an article of 98 per cent. purity should be demanded; substances described as "agricultural bluestone" or "agricultural sulphate of copper" must be avoided, as these are usually adulterated with iron sulphate. In this *Journal* for September last a number of cases were recorded of the sale in this country of adulterated copper sulphate; it is clear, therefore, that it is important for the fruit-grower to insist on an article of 98 per cent. purity.

‡ The strength of Bordeaux mixture at present most widely recommended in the United States is 4½ lb. of copper sulphate, 4½ lb. quicklime, 50 gallons (Imperial) of water. This strength is expressed in America by the formula 4 : 4 : 50, since, as Mr. S. U. Pickering has lately pointed out, the relative value of the American and Imperial gallon is different, the former weighing 8·345 lb. and the latter 10 lb. As, however, excellent results have followed the use in this country of Bordeaux mixture made of the strength 4 : 4 : 50 (Imperial), and as, further, some "scorching" is liable to occur on some varieties of apples, it would seem advisable, for the present at any rate, for the English grower to continue to use this as his "standard" mixture.

coarse sacking, in a few gallons of cold water, from a stick placed across the top of a tub, or wooden bucket. If this be done over night, the copper sulphate will be found to be dissolved in the water by the morning. (If hot water be used, the copper sulphate can be placed at the bottom of the tub or bucket, and be dissolved in a few minutes.) Then add water to make twenty-five gallons. Now take the four pounds of quicklime, and put it in a tin pail. Add a few pints of water until all the lime is slaked, taking care to add only a little water at first; in this way a thick creamy paste is obtained. Add water to make twenty-five gallons. We have now twenty-five gallons of copper sulphate solution, and twenty-five gallons of "milk-of-lime." When the two substances are thus diluted with water, they can be mixed together by pouring one into the other, or a bucketful of each can be poured simultaneously or alternately into a third tub,—a wooden bucket being used for the copper sulphate solution. The "milk-of-lime" must be well strained, and it is advisable also to strain the Bordeaux mixture before spraying. In this way we obtain fifty gallons of Bordeaux mixture of the best quality.

Two points are of primary importance in making Bordeaux mixture. The first is that *quicklime*, in lumps, that is to say, as freshly burnt as possible, should be used. Powdered *air-slaked* lime, such as is often found in builders' yards, will not make Bordeaux mixture. The second point to observe is that the two constituents, *viz.*, copper sulphate and lime, are diluted with water as much as possible (consistent with the formula) *before being mixed together*.* If concentrated solutions of copper sulphate and lime are mixed together, and

* The method of mixing described above is that recommended by all scientific authorities in the United States and in our Colonies. Bordeaux mixture prepared by growers in accordance with these instructions has long proved in these countries—and more recently in England—to be of the greatest value, under practical conditions in the orchard and plantation, in keeping off fungus pests from cultivated plants. According, however, to the recent important investigations of Mr. S. U. Pickering into the nature of Bordeaux mixture, a slightly superior method of mixing the two constituents is "to take the lime in as weak a condition as possible and, consequently, the copper sulphate in as strong a condition as possible, and to add the copper sulphate to the lime. The 'milk-of-lime,' after being diluted with the bulk of the water and stirred up several times during about half an hour, should be left for the grosser particles to settle before the copper sulphate is added to it, and, after the addition of this, very little more stirring should be done."

water then added to make up the fifty gallons, the resulting Bordeaux mixture will be of very inferior quality.

Bordeaux mixture is fully efficacious only when freshly made, and will not keep. If more than a day old it requires to be very thoroughly and constantly stirred while being used, and the use of *only freshly-made* Bordeaux mixture is far more economical in the long run, and is here strongly recommended.

If a considerable quantity of Bordeaux mixture is required for use, the making of *stock solutions* of copper sulphate and lime, which can be kept through the spraying season and used when wanted, saves both time and labour, and is free from all objection. The stock solutions are made as follows :— Take two 50-gallon barrels. In one dissolve 50 lb. of copper sulphate in exactly 50 gallons of water. In the other slake 50 lb. of lime by the gradual addition of a little water; to the creamy paste thus obtained add water to make exactly 50 gallons of “milk-of-lime.” These stock solutions will keep for months. Before the “milk-of-lime” is used, the contents of the barrel must be thoroughly stirred as the slaked lime will have sunk to the bottom. (Care must be taken to stir the “milk-of-lime” *very thoroughly each time before measuring it out*, so as to get the slaked lime thoroughly in suspension. If this is done there is no difficulty in obtaining the correct quantity of lime per gallon of fluid.) Each gallon which is taken out from the “stock solutions” will be equivalent, respectively, to 1 lb. of copper sulphate or 1 lb. of lime. The required amount of each stock solution is then diluted with water, according to the formula given above, before being mixed together. The “stock” copper sulphate solution must be measured out in a wooden pail.

If it be desired to economise space the “stock solution” of copper sulphate may be kept at the strength of 2 lb. of copper sulphate to each gallon of water, that is to say, 100 lb. of copper sulphate may be dissolved in 50 gallons of water. It is not well, however, to increase the strength of the “stock solution” of lime, since the slaked lime in “milk-of-lime” made at the rate of 2 lb. of quicklime to one gallon of water settles so quickly that it cannot be measured out accurately.

The barrels containing the “stock solutions” must be kept

under cover, *i.e.*, protected from sun and rain. If stood in a shed, and covered with fairly close-fitting lids—made by nailing sacking round the edges of a wooden lid—such “stock solutions” keep perfectly satisfactorily throughout the spraying season. Two 50-gallon barrels hold sufficient for the making of 625 gallons of Bordeaux mixture; while if the “stock solution” of copper sulphate be increased in strength to 100 lb. in 50 gallons of water, and another 50-gallon barrel of “stock solution” of “milk-of-lime” is added, these three barrels will supply enough to make 1,250 gallons of Bordeaux mixture. By storing such “stock solutions,” made just before the summer spraying season commences, the grower has the means of obtaining in a few minutes at any time a large supply of Bordeaux mixture of the best quality.

The making of Bordeaux mixture on a large scale from “stock solutions” is greatly facilitated if some simple “plant” be erected, such as that shown in Fig. 1. The erection consists of two elevated platforms. The higher platform is carried on four 9 ft. 6 in. posts, 5 in. × 4 in., sunk 2 ft. 6 in. in the ground and well rammed. Joists, 5 in. × 4 in., connect the heads of the posts, into which they are halved. An intermediate joist is halved into the middle of two opposite joists. The upper platform is 5 ft. square, and consists of 6 in. × 1 in. boarding in the rough, laid to the edges. The lower platform, which is 6 ft. 6 in. square, is similarly constructed, and is carried on sleepers, 6 ft. long and 10 in. by 5 in., set vertically and sunk 2 ft. 6 in. in the ground and well rammed. The two structures are bolted together at the two back posts and where the front post of the higher platform touches the joist of the lower platform.

On the higher platform are two 50-gallon “dilution barrels,” marked inside at the 50-gallon level, and fitted with taps. If possible, water should be laid on to this higher platform (note end of hose in Fig. 1). On the lower platform stands a vat (fitted with a tap) capable of containing 100 gallons. A short length of hose (“canvas hose” is convenient to use) is fitted to the taps of the “dilution barrels” and of the 100-gallon vat. The process of making 100 gallons of Bordeaux mixture is as follows:—Eight gallons of the “stock solution” of “milk-

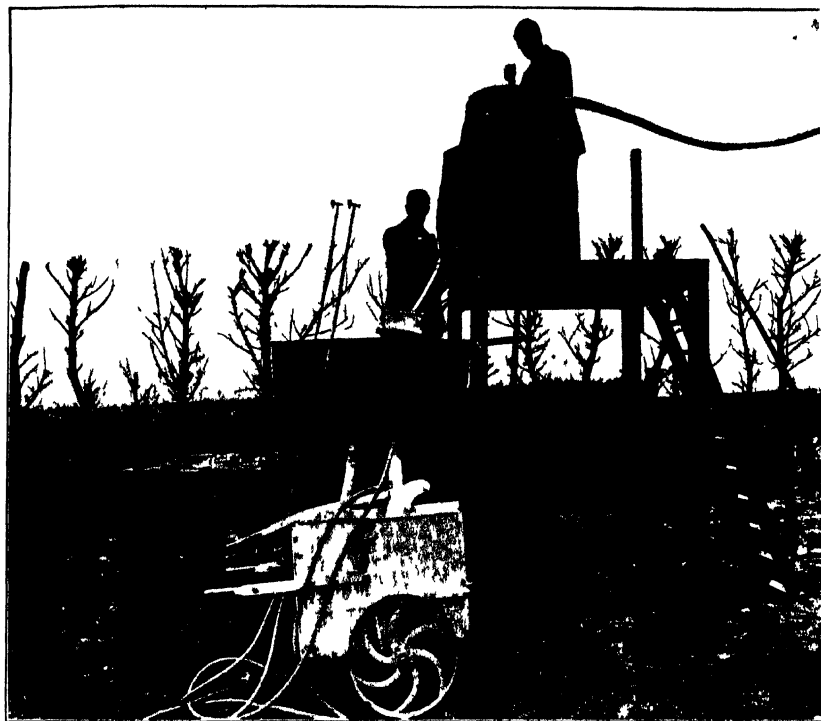


FIG 1 —PLANT FOR MAKING BORDAUX MIXTURE FROM STOCK SOLUTIONS.



FIG 2 —SPRAYING MACHINE (SIMILAR TO FIG. 14) ADAPTED FOR USE WITH A HORSE, FOR SPRAYING FRUIT OR HOPS

of-lime," and the same amount of copper sulphate "stock solution" (or four gallons only if this has been made of the strength of 2 lb. of copper sulphate to the gallon of water) are carried up to the upper platform, and poured separately into the two "dilution barrels," which are then filled with water up to the 50-gallon mark. The 50 gallons of "milk-of-lime" thus obtained in one of the barrels are stirred vigorously for a couple of minutes. A strainer is now placed over the vat, in such a position as to allow the hose from the taps of the "dilution barrels" to project into it. The taps of the "dilution barrels" are now turned on, and—the contents of the barrel containing the lime being stirred continuously—the two 50-gallon barrels empty themselves through the strainer into the vat, filling it with 100 gallons of Bordeaux mixture. (See Fig. 1.) The whole process can be easily controlled by one man standing on the higher platform, as with his stirring-pole he can reach the taps and so regulate the flow if necessary, and also stir and clear the strainer should this become clogged.* The Bordeaux mixture is immediately ready for use, and can be run off from the tap of the vat into the spraying machine. Thus all the labour and waste of time in handling the mixture are saved; and, given some such "plant," as is shown in the illustration, and "stock solutions," 100 gallons of Bordeaux mixture can be prepared in a few minutes at any time during the spraying season. It is of the greatest importance for a fruit-grower to have the means of obtaining the proper "wash" directly the right period of vegetation and suitable weather conditions arrive,—spraying at the right time is just as important as spraying with the right "wash."

Good straining of Bordeaux mixture is essential for success in spraying, since, as pointed out below, it is absolutely necessary to use a nozzle with a very fine opening. It is best to strain the mixture twice, in the following manner:—First, a strainer with meshes of medium fineness should be placed over the vat (see Fig. 1). Then a second straining must be

* In the actual "plant" shown in Fig. 1 the top platform is higher than it need be to allow of the contents of the "dilution barrels" running into the vat. This extra height was fixed upon in order to allow at any time of a 50-gallon barrel being placed on the lower platform, when lesser quantities of any mixture made for experimental purposes can be run into it from smaller "dilution barrels" placed on the upper platform.

given as the Bordeaux mixture flows into the spraying machine. Here the best type of strainer is one with copper gauze with very fine meshes—35 to 40 holes to the linear inch. Such a strainer, made with a wooden bottom and sides of copper gauze, is fitted to spraying machines of the type shown in Fig. 15. A simple and very useful type of strainer (suitable for "barrel" spraying machines and for general straining), as recommended by the United States Department of Agriculture,* is made as follows. It is in the form of a wooden box about a foot square (Figs. 3 and 4), the bottom of which is formed of hard wood, with a hole bored through it, into which a piece of gas-pipe, $1\frac{1}{2}$ in. or 2 in. in diameter and from 6 in. to 9 in. long, is fitted. The box is, of course, open at the top. Fitting just inside this box is a second and lighter box, also open at the top, and having an overhanging strip nailed round the top which supports it. The bottom of this inner box should be made so as to slope at an angle of about 30° , and should be made of fine copper gauze. The slanting bottom makes it harder to clog, and the inner box, being removable, can be inverted and washed in a tub of water (Fig. 4). Bordeaux mixture if properly strained will pass easily through nozzles which throw the finest "misty" spray, while if not properly strained, frequent clogging of the nozzle will result. I have on several occasions sprayed for a whole day using the nozzle shown in Fig. 10—where all the fluid has to pass through the minute hole in the circular disc (to right, below, in the illustration)—and owing to the Bordeaux mixture used having been properly strained, have not had to stop once for any blocking of the nozzle.

If the lime used is freshly burnt (and it must never be forgotten that air-slaked lime is useless for making Bordeaux mixture) and carefully weighed out there is no need to test the mixture before using it. When using "stock solutions" it is a good plan to apply a test at the first mixing. A rough test consists in immersing a clean iron wire or French nail in the Bordeaux mixture for one minute; if safe to use, the mixture does not affect the nail; while if unsafe, a copper-plated appearance is given to it. A more delicate and quite simple test is as follows:—Procure from a chemist a 10 per cent.

* *Farmer's Bulletin*, No. 243.

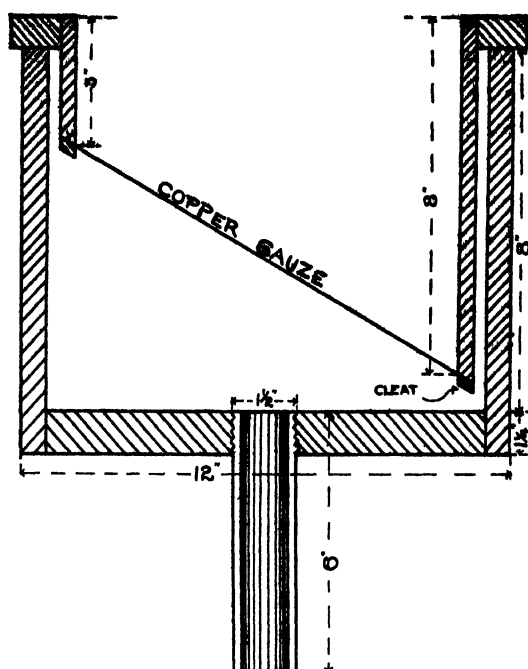


FIG. 3 --CROSS SECTION OF STRAINER FOR BORDEAUX MIXTURE



FIG. 4 --STRAINER, SHOWING THE INNER BOX TAKEN OUT FOR CLEANING.

solution of ferrocyanide of potassium (which is a poison) and pour a little of this into a white saucer; then drop a few drops of the Bordeaux mixture into the ferrocyanide of potassium. No change of colour occurs if the mixture is safe to use, while a cloudy reddish-brown discoloration (very easy to see) occurs immediately if the mixture is unsafe to use. An unsafe mixture can be made safe by adding more "milk-of-lime" until it passes the test.

In spraying fruit trees (and also potatoes) there is no need whatever to add anything to the Bordeaux mixture with the object of making it adhere better; soap is quite unnecessary and should never be used, and treacle is useless.* The nature of the precipitate which constitutes Bordeaux mixture causes it, when applied in a "misty" spray (see below), to adhere most intimately to the part sprayed.

Ready-made Bordeaux mixture is at present put on the market in powder form, and as a paste. The best results, however, in my experience, are only obtained when Bordeaux mixture is home-made and freshly-mixed. As regards the numerous proprietary Bordeaux mixtures put up in powder form, the fruit-grower must be warned against using these. Such preparations are made by mixing lime and copper sulphate in concentrated form, and then drying and grinding the product.† As Mr. S. U. Pickering has lately pointed out,‡ Bordeaux mixture made from these proprietary powders settles at least ten times more rapidly than the freshly-prepared mixture; consequently it is a very inefficient spraying material. There is a general consensus of opinion that in practical spraying dried Bordeaux mixture is less efficient than the ordinary mixture. As long ago as 1900, Mr. R. U. Moss pointed out‡ how thoroughly inferior such ready-made Bordeaux mixtures are to the home-made freshly-mixed article. One of the best known of these mixtures sold in powder form was tested in two ways. In the first experiment the powder after being mixed with water according to the directions was thoroughly shaken up in a glass cylinder, and then allowed to stand for five minutes. It was

* See Pickering, in *Jour. Agric. Science*, iii (1909).

† *Jour. Agric. Science*, iii, 170 (1909).

‡ *Econ. Proc. Royal Dublin Soc.*, vol. i, part iii, p. 109.

found that the suspended matter (containing all the copper) had almost completely disappeared, through subsidence, from the upper half of the liquid in so short a time as five minutes—the percentage of copper in the upper half of the cylinder being only 1·6. Another similar cylinder was filled with home-made Bordeaux mixture, and exactly the same treatment given to it, but here the tendency of the suspended matter (*i.e.*, all the copper) to subside was very different,—the percentage of copper in the upper half of the cylinder, after five minutes, being 48·4. In the second experiment, the adhesive property of home-made Bordeaux mixture was compared with that of the mixture made from the proprietary powder mentioned above. Investigations showed that in the case of leaves sprayed with home-made Bordeaux mixture, the first shower of rain removed only 2·92 per cent. of the copper, and the second shower 3·65 per cent. of the copper—making a total washed off of 6·57 per cent. of the copper. In the case of leaves sprayed with Bordeaux mixture made from the proprietary powder the first shower removed 46·60 per cent. of the copper, the second shower 5·97 per cent. of the copper—making a total washed off of 52·57 per cent. of the copper.

The Irish Department of Agriculture have carried on investigations for several years past in the spraying of potatoes with Bordeaux mixture, both home-made and made from spraying powders, and now strongly urge the farmer to prepare his own mixture.

It is clear that on account of the marked tendency of the suspended matter to settle, and of the very low adhesive powers,* all Bordeaux mixtures put up in powder form should be avoided.

Ready-prepared Bordeaux mixture in paste form stands in quite a different category to the above-mentioned Bordeaux powders. Through the recent chemical discoveries of Mr. Pickering, Bordeaux mixture can now be prepared by a new process and put on the market as a concentrated paste. From the chemical standpoint, certain advantages (which cannot be discussed here) are claimed for the Bordeaux mixture made from this paste over that made by mixing equal quantities of copper sulphate and lime, as described above.

Of what value these improvements from the chemical point of view will prove in practical spraying against fungus pests has yet to be ascertained, for there is probably a biological side to the question of the action of fungicides. For the reason given below I consider that the practical fruit-grower should continue to make his Bordeaux mixture with equal parts of copper sulphate and lime, *i.e.*, with a considerable excess of lime. So far as I have seen, if Bordeaux mixture is made (like that made from the Woburn Bordeaux Paste) with practically no excess of lime,* it either does not adhere so well to the parts sprayed, or more quickly washes off under the action of rain or dew, and consequently does not protect the plant for long from fungus pests. In 1908 I compared the adhesive power of Bordeaux mixture made with "milk-of-lime," *i.e.*, a mixture containing an excess of lime, with that of the mixture made with "lime-water," *i.e.*, a mixture containing no excess of lime. The two mixtures were tested in potato spraying on a fairly large scale. It was found that the latter mixture was washed off comparatively soon by the rain, and in consequence of this the "blight" (*Phytophthora infestans*) was not kept in check to anything like the same extent as where the haulm had been sprayed with the Bordeaux mixture made with "milk-of-lime." Experiments were made during 1909 with Bordeaux mixture made from the Woburn Bordeaux paste, both on apple trees and on potato haulm. In both cases all visible traces of the spray had disappeared several weeks before the spray from Bordeaux mixture made with "milk-of-lime" had become washed off. In the case of apple foliage, the "scab" fungus began to grow on the leaves, showing that there was a complete absence there of any fungicide. The same experience has been reported to me by a fruit-grower in East Kent, who for several seasons past has been successful in keeping a large acreage of apples practically free from "scab" by spraying with home-made Bordeaux mixture, although previously this pest had been very prevalent. This grower writes as follows: "I experimented with the Bordeaux paste and used it

* Bordeaux mixture containing no excess of lime can be easily made by using just enough lime, in the form of "lime-water," to precipitate all the copper (see *Woburn Exptl. Fruit Farm*, 8th Report, p. 9 (1908)).

in exactly the same way as that which I made myself and found it practically worthless. Those trees which were sprayed with it (three times) were covered with apple "scab," while those sprayed with the home-made mixture were kept practically free." On the other hand, a fruit-grower in Sussex tells me that the use this season of Bordeaux mixture made from the Woburn paste kept his trees healthy, although last season they suffered severely from "scab."*

From my own experience I should advise the commercial fruit-grower at present—until more experiments have been made—to continue to make the bulk of his own Bordeaux mixture himself, while using a small quantity of the Woburn Bordeaux paste experimentally.

II. *The application of Bordeaux Mixture.*—The best type of spraying machine for spraying with Bordeaux mixture depends to a large extent on such circumstances as the height of the trees and whether these are grown in a plantation or in an orchard. But the chief point that requires to be emphasised is that the nature of the spray is the essential factor for success in spraying with Bordeaux mixture. The spray *must* be very fine and "misty," or smoke-like; a hanging "mist" or "fog" must be produced which drifts over and through the tree and deposits on the surface of the leaves excessively minute drops, which when dry give the parts of the trees which have been sprayed the appearance of being almost uniformly covered with a very thin bluish film or dust. Such a deposit of Bordeaux mixture is so intimately attached to the surface of the leaf or fruit that it does not readily wash off. Last season, notwithstanding the frequent rains, I saw apple trees which had been properly sprayed with Bordeaux mixture still showing a bluish film over the leaves (and thus completely protected from the "scab" fungus) nine weeks after the application.

In order to obtain the right kind of spray, attention must be paid to two points; (1) a special type of nozzle must be used, and (2) sufficient pressure must be maintained at the nozzle. If these two requirements are not fulfilled, the full

* Mr. Pickering (*Woburn Expt. Fruit Farm*, 11th Report, p. 178) says, "Reports received have led to the conclusion that the paste has been about as efficient [during the season 1909] as ordinary Bordeaux mixture."

benefit from spraying with Bordeaux mixture cannot be obtained.

As regards the nozzle, the fact must be emphasised that a special type is required, which may be called the "Bordeaux nozzle." There is at the present time a considerable amount of spraying with Bordeaux mixture being done in this country with unsuitable nozzles. This results not only in a waste of labour and material, but even in actual harm—sometimes to the trees by "drenching" those varieties which should be only lightly sprayed (see below), and sometimes (in the case of orchards) by causing so much dripping from the trees and actual spraying of the grass around, that poisoning of sheep which may be allowed to feed on the grass in the orchard may result. It seems probable that actual cases of the death of sheep poisoned by feeding on grass around trees improperly sprayed with Bordeaux mixture occurred in Kent last season.

The *wrong* kind of spray for use with Bordeaux mixture is shown in Fig. 5; here, although a small quantity of "misty" or smoke-like spray can be seen hanging in the air, the greater amount of the spray produced is more or less jet-like, as shown by the lines of large drops, which should be absent. Most kinds of nozzles used for hop washing throw a spray of this nature, and at the present time much wasteful or even dangerous spraying is being done in this country with this type of nozzle. The *right* kind of spray is shown in Fig. 6; here the greater part of the fluid is broken up at once as it leaves the nozzle into a very fine "misty" or smoke-like spray.*

It follows that because the spray of Bordeaux mixture must be "misty," and not jet-like, it must be carried close to the part sprayed. In the case of tall trees this necessitates the use of long bamboo "extension rods." The fact that tall trees cannot be sprayed with Bordeaux mixture by means of a jet-like spray sent up from the ground cannot be too strongly insisted upon; to secure a fine "misty" spray which shall drift

* Arsenate of lead (which will protect the leaves of fruit trees from all leaf-eating caterpillars) can be mixed with Bordeaux mixture with perfect safety; this combined insecticide and fungicide should be applied in a smoke-like spray as described here.

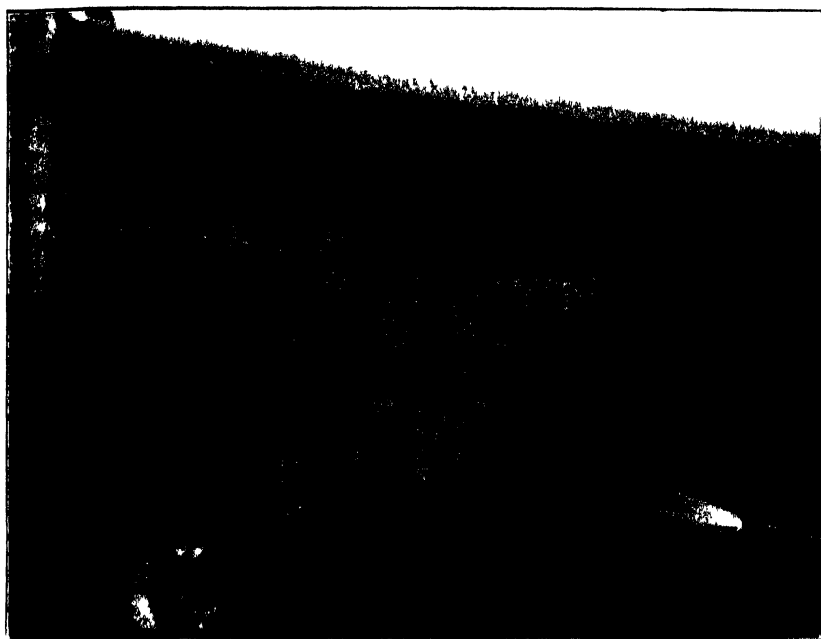


FIG 5 THE *Wrong* KIND OF SPRAY FOR BORDEAUX MIXTURE

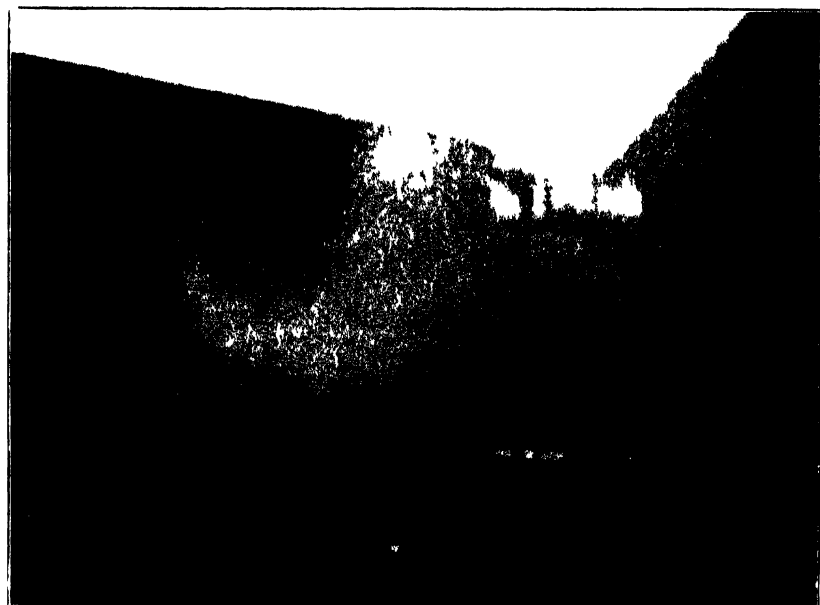
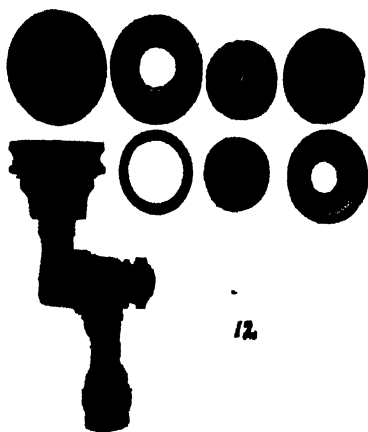
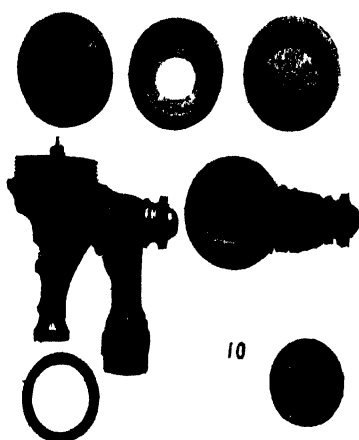
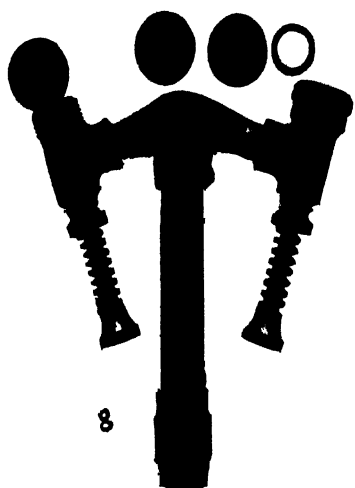
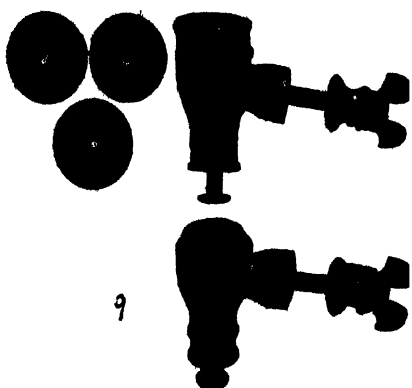
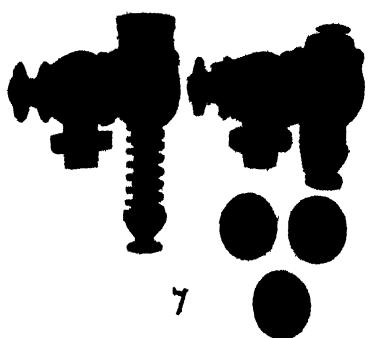


FIG 6 —THE *Right* KIND OF SPRAY FOR BORDEAUX MIXTURE

sack sprayers the cost of spraying one acre of trees, about 10 or 12 years' old, and planted 10 feet apart, is approximately 5s. for the material, and 10s. to 12s. for the labour. While knapsack sprayers, when kept in good order, and when on the backs of men who pump sufficiently hard to maintain the necessary pressure, are satisfactory, there is always the danger of these two requirements not being fulfilled, when an inferior spray is produced, and the full advantages of the use of Bordeaux mixture will not be obtained. For spraying young trees in newly-planted plantations a knapsack sprayer is excellent.

A very useful type of machine is shown in Fig. 14. The pump is of Canadian make, and costs £3 15s.; it can be fitted to a 30-gallon barrel provided with a "stretcher" or hand-barrow arrangement—as shown in the illustration—at an additional cost of £1 2s. 6d. The two iron lances are fitted with a cluster of nozzles. This "Sparamotor" nozzle gives an excellent "misty" spray; it is best used in a cluster of three (see Fig. 13). This machine can be carried by two men in closely-planted plantations without damaging the trees or bushes. It is used to a considerable extent in the Evesham and Pershore districts, and has lately been introduced into Kent. The pump is strong, and is in extensive use in Canada. One of these pumps has been used for the past two seasons by a grower in Kent for spraying both fruit trees and hops. In this case the machine when used with a horse in the hop-garden is adapted by attaching temporarily an axle with two wheels to the front legs, and a whippetree to the front handles of the "stretchers." The cost of this spraying outfit (exclusive of wheels and whippetree), as shown in Fig. 2, is £8 10s.

A very convenient type of machine, with either wooden or galvanized iron tank, of from 20 to 40 gallons' capacity, is shown in Fig. 15. Machines of this type, very strongly made, are now constructed by several firms in Kent. The machine shown in the illustration contains 30 gallons, and is built very narrow (measuring only 22 in. wide over all) for use in closely-planted plantations. An air-chamber is supplied of sufficient size to secure the maintenance of the necessary pressure between the strokes of the pump. With a good



NOZZLES FOR SPRAYING MACHINES SUITABLE FOR BORDEAUX MIXTURE.
(For description, see p. 809.)

"Bordeaux nozzle"—such as the "Vermorel" or the "Improved Vermorel" (of English make), which are sent out with these machines—there is no difficulty in keeping up the pressure and obtaining a continuous fine "misty" spray without undue exertion being required of the man at the pump. More uniformly good spraying can be secured with such a machine than with a knapsack sprayer. The cost, including two lengths of hose, brass or bamboo extension rods, and nozzles, is from £10 to £12.

For orchards, or for places where the trees can be reached from a path, the type of machine shown in Fig. 16 is excel-

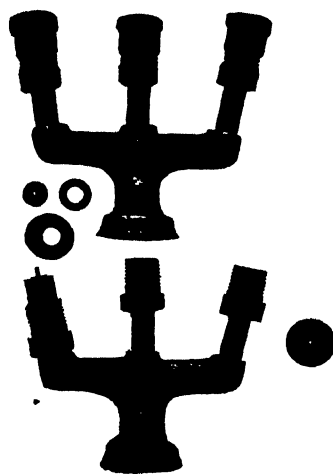


FIG. 13.—NOZZLE FOR SPRAYING MACHINE. (For description, see p. 810.)

lent. It is both strong and cheap. The pump, of American make, costs £3 2s. 6d.; the barrel and carriage on wheels (as shown in the illustration) costs £3 5s. extra. Fitted with "Mistry" or "Mistry Junior" nozzles, it applies Bordeaux mixture in a uniformly fine "misty" spray.

A useful spraying outfit for large trees in orchards is shown in Fig. 17. The pump is double-acting and very strong; there is a large air-chamber, provided with a pressure gauge. A pressure of 70 or 80 lb. can be easily maintained by one man pumping. Mounted on a trolley on wheels, with a barrel of Bordeaux mixture by its side, it constitutes a very efficient outfit. By means of long extension rods, worked

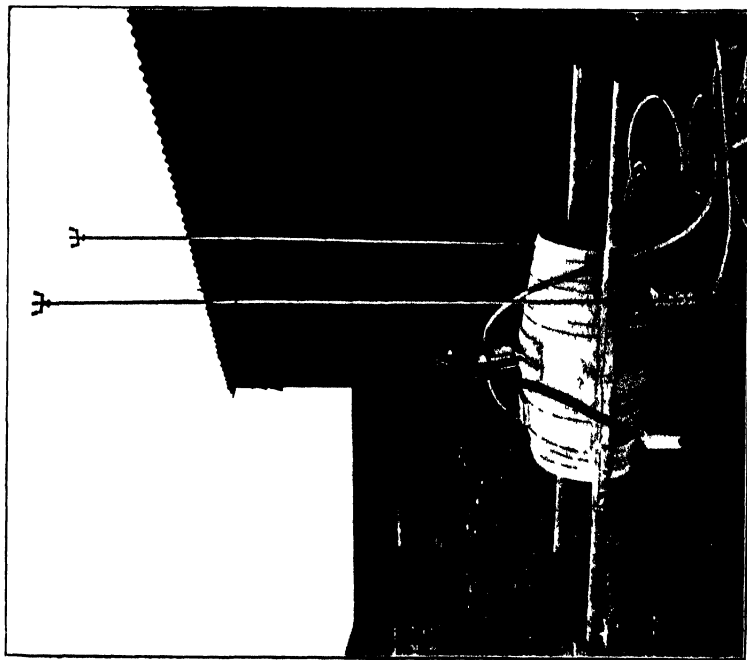


FIG 14.—SPRAYING MACHINE WITH HAND BARROW
FOR CARRYING

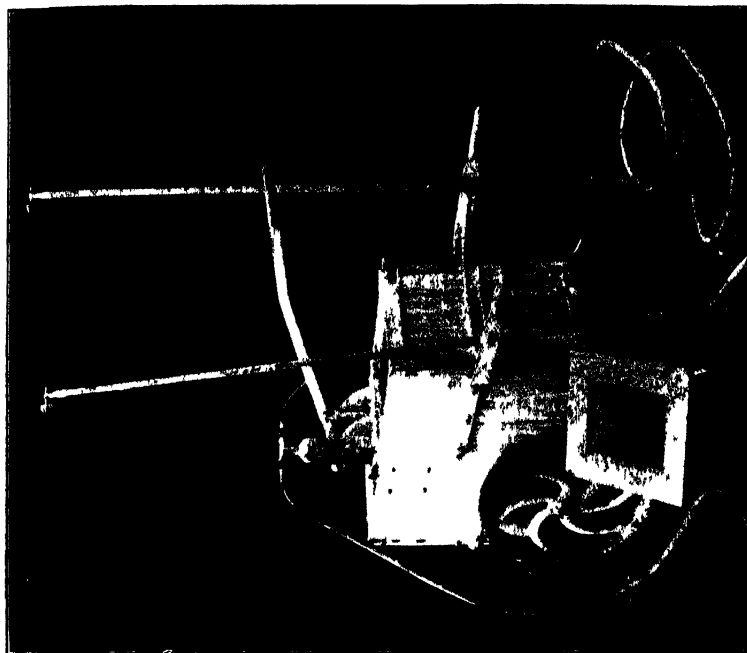


FIG 15.—SPRAYING MACHINE WITH NARROW TANK FOR
CLOSELY PLANTED PLANTATIONS

by men standing either on the ground or in a van or waggon, orchards of tall cherry trees affected with "Brown Rot" or "Cherry-leaf Scorch," or of tall apple or pear trees affected with "Scab," can be easily and very thoroughly sprayed. The cost of the pump is £7.

Another machine for use in orchards has a barrel holding 60 gallons, and a double-acting pump worked by two men. The pump costs about £11; the whole outfit, with two 30-ft. lengths leading into four 15-ft. lengths of hose, with four extension rods and sets of nozzles, costs about £24.

Another method is to have a powerful pump (mounted on a carriage on wheels) placed on the headland of a plantation or among the trees in an orchard, and to carry hose from this to the trees. The suction pipe of the pump draws the Bordeaux mixture from a trough or tub, or from a water-cart, placed by its side. I have seen a large acreage of apple orchards sprayed very easily and efficiently in this manner. The best type of pump is a double-barrel lift-and-force pump, worked by two men who are guided in keeping up the necessary pressure by reading from the pressure gauge. The cost of such a pump is from £14 to £20. A main delivery pipe is laid from the pump through a part of the plantation or orchard, and cross-piece connections with delivery pipes are laid to right and left at regular distances, so that a complete block or section of the trees is sprayed before moving the pump to the next point. Three hundred yards or more of hose can be laid down, and six or eight men can spray from it. With such a plant, however, it is doubtful if a pump worked by hand-power is, in the long run, so economical as a power-driven machine. There are now various types of oil-, petrol-, and steam-driven engines specially constructed for spraying work, and various methods of laying down pipes or hose; these, however, cannot be treated of in this article.*

DESCRIPTION OF FIGS. 7 TO 13.

FIG. 7.—"Vermorel" nozzle (French make), with disgorger (shown pushed up in example to right, where the cap is removed). The caps have small holes (bevelled at the edge from the outside) of three different sizes. The nozzle can be adjusted by the screw to spray in any direction.

* A collection of spraying machinery (including knapsack sprayers), as well as of the various types of nozzles, is kept at Wye College, Kent, and can be seen at any time by appointment

FIG. 8.—Two “Vermorel” nozzles (American make), with disgorgers, on brass Y. The caps have very minute holes, and are slightly funnelled on the inside round the hole.

FIG. 9.—Improved “Vermorel” nozzle (English make) with disgorger. The caps have small holes (bevelled at the edge from the outside) of three sizes. The nozzle can be adjusted, by means of the winged screw, to spray in any direction.

FIG. 10.—“Mistry” nozzle, with disgorger. A removable circular disc (shown to right, below), made of hardened tool steel, with a minute opening (bevelled at the edge from the outside) fits into the cap of the nozzle, as shown. The nozzle can be adjusted, by means of a screw, to spray in any direction. Made of bronze.

FIG. 11.—Two adjustable “Mistry” nozzles, with disgorgers, on a brass Y.

FIG. 12.—“Mistry Junior” nozzle. The fluid is sent up through the opening shown below, to right; it then meets the thick brass disc (shown in the lower row, middle, and also, in position, in upper row, to right) through which it is broken up with a rotary motion into two jets which escape through two slanting channels in the brass disc; on the top of the thick brass disc is placed (separated by a leather washer) a thin disc of hardened tool steel with a small opening, bevelled at the edge from the outside (upper row, second on right), by which means the jets are broken up into a smoke-like spray (see Fig. 6). The two discs are fixed in position by the screw-cap, shown by itself in upper row, second on left; enclosing the discs, in upper row, on left; and screwed in position in the nozzle below. Made of brass.

FIG. 13.—“Sparamotor” nozzle, a “three-cluster.” The cap of each nozzle has a deeply levelled opening, into which, from the inside, a small perforated disc fits. The nozzle, if blocked, can be cleared at once by a simple and very effective contrivance: each nozzle can be pulled down (as shown in the lower “cluster,” on left) until the disgorger-pin projects through the opening of the disc and so clears it. When in action the force of the spray keeps the nozzle pushed out, as in the upper “cluster.”

THE ORGANISATION OF THE MILK SUPPLY.

J. NUGENT HARRIS.

Secretary of the Agricultural Organisation Society.

ONE of the most important agricultural problems of the present day is the efficient development of a pure milk supply, and although various methods have been suggested from time to time, they have generally involved the application of compulsory measures which would be most distasteful to many of those principally concerned. The object aimed at can, however, be effectively and economically carried out by a system of organisation in which the producers themselves voluntarily undertake to comply with the conditions necessary to ensure, not only the production, but the supply to the consumer, of milk which is above suspicion. These conditions are, it is true, far-reaching, including as they do healthy

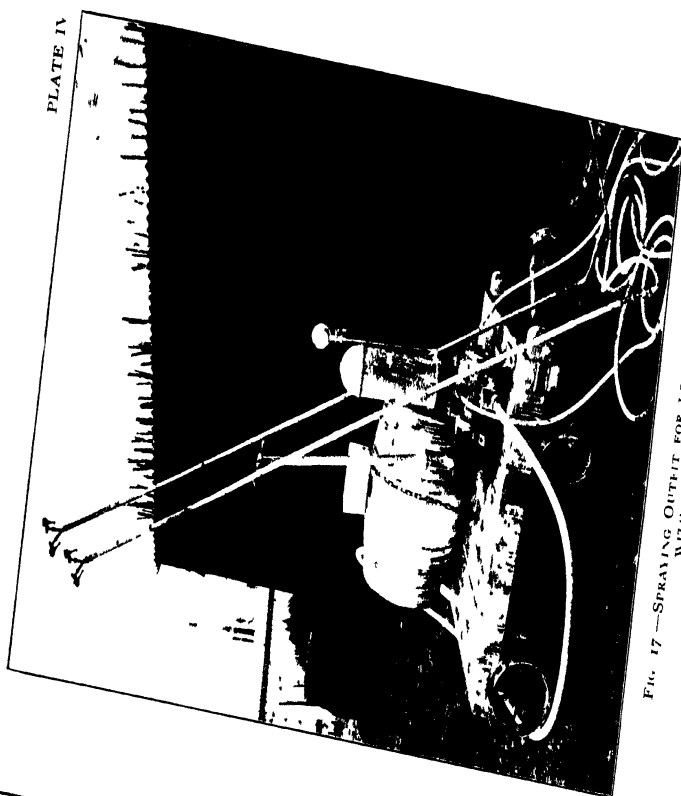


FIG. 17.—SPRAYING OUTFIT FOR USE IN ORCHARDS
WITH TAIL TRAILER

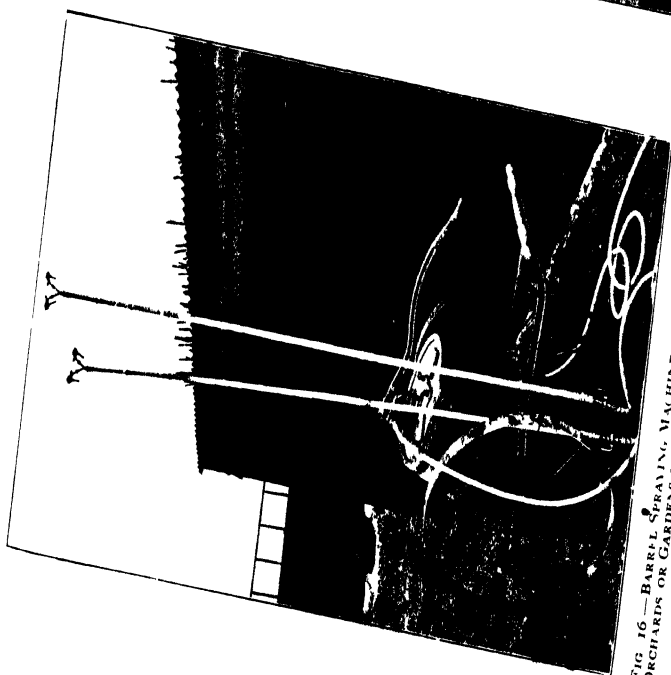


FIG. 16.—BARREL SPRAYING MACHINE ON WHEELS FOR USE IN
ORCHARDS OR GARDENS WHERE THE TREE CAN BE REACHED
FROM A PATH

cattle, proper feeding, sanitary cow-sheds, clean milking, the filtration, aeration and cooling of the milk, and its maintenance at a low temperature until it reaches the consumer; and it is by co-operation between the producers that they can be most economically and satisfactorily carried out.

It would be necessary in the first place that the farmers in a milk-producing district should agree to a systematic inspection of their herds and dairies so as to secure clean production, and then combine in establishing, near a railway station, a milk collecting depôt, equipped with a refrigerating plant, at which all the milk produced would be collected, refrigerated, and tested. Thence it would be forwarded to a town receiving depôt, properly equipped with the necessary plant to deal with the milk on its arrival, and then supplied to retail shops or "rounds-men" in the ordinary way. Such a scheme would solve the surplus milk problem, as, the milk output being under the control of the organisation, the surplus would be dealt with either by selling it as raw milk or by converting it into cheese, cream, or other milk products.

That there is nothing impossible in such a scheme is proved by the success which has attended its adoption in Denmark, where the farmers have voluntarily combined to secure the delivery of fresh milk to the town of Copenhagen under conditions of the utmost stringency. Fortunately, we need not now go to Denmark for examples, as the principle involved has been adopted and is working successfully in a number of districts in this country.

The Wensleydale Pure Milk Society may be chosen as the first example because it combines the producer, the distributor, and the consumer in its operations. The formation of the Society came about in the following way: Mr. Philip Burt of York, and Dr. Moore Ede of Newcastle, were members of a party who visited Denmark in 1904. They were impressed by the methods of work carried out by the Copenhagen Pure Milk Company, and, as a result, undertook the establishment of the Wensleydale Society, which has its headquarters and dairy at Northallerton, and supplies large quantities of pure milk to the principal towns in the North of England. The Society aims at securing (1) healthy and clean cows, (2) sanitary buildings, (3) clean milking, (4)

careful filtering, (5) immediate cooling, and (6) good quality. The milk is cooled and sent to Northallerton, where the Central Dépôt of the Society is situated, for bottling. The contract signed by each farmer who supplies milk contains the most stringent conditions. The cows must be certified as fit by the Society's inspector; special rules must be followed for feeding, milking, and for general treatment. The strictest cleanliness with regard to milking and the care of the milk cans is enforced. At milking time, as each can of milk becomes full, it is removed to the shed for filtration. From the filter the milk runs over a cooling apparatus, is received into twelve-gallon cans which are closed and sealed by the farmer, and sent off to the railway station. The farmer must exercise intelligence and energy to satisfy the demands of the Society, but an increased price for the milk repays his labour. On one farm at Hawes only cows that have passed the tuberculin test are kept, and the milk from these cows is sold at an extra charge, and is designed especially for children and invalids.

Inspectors from the Society make frequent surprise visits to the various farms in order to see that all the conditions demanded are being carried out. A visit to one of the farms will enable anyone interested in the matter to see how proper conditions can be maintained. The cow-sheds and dairies are models of sanitary requirements; the shippens are airy and well lighted; sanitary troughs are used, and the cows are fed from the front of the stalls—the habit of carrying food through the stall being condemned. The buildings are lime-washed, and must be cleaned twice daily, before each milking. When the milk arrives at the station at Northallerton, the cans are delivered at the siding leading to the dépôt, and are removed to the bottling department. The seals are broken and the milk in each can is examined. If for any cause the milk is rejected a sample is sent to the laboratory to be tested. The milk after being weighed is pumped into a tank raised above the level of the other machinery, is filtered through sterilised cotton wool into a large refrigerator, and reduced to about 40° F. The milk is then bottled and a label attached to each bottle stating whether the liquid is morning or evening milk, and for each day of the week there is a different

coloured label, so that at a glance the customer can tell the age of the milk. When the empty bottles are returned to the depôt they are placed in a tank of hot water and soda and cleaned out by an electrically-driven brush. They are then rinsed in cold water, dipped in a solution of Condyl's Fluid, again washed, and then removed to the bottling room ready for refilling.

In the year 1908 new machinery was installed and has proved most effective and economical. A wide-mouthed bottle, which is fitted with a new wood-pulp disc each time it is sent out, has superseded the old type, and has been found satisfactory. A specially constructed and improved milk van has been provided for the Society's use by that progressive railway company, the North Eastern. To meet the requirements of the medical profession, the Society now manufactures and sells milk specially soured with pure cultures of lactic acid bacteria, and a considerable business is being developed in this commodity. The Society is now dealing with about 400,000 gallons of milk per year, and has a turnover of between £20,000 and £25,000.

The Eastern Counties Dairy Farmers' Co-operative Society is an offshoot of the Eastern Counties Dairy Farmers' Association, which was formed to protect the interests of the dairy farmers of Essex. It was found that to enable the farmers to obtain substantially better prices for their milk, a closer form of combination was required, and the co-operative society was formed with fifty-two members, each of whom took twenty £1 shares, on which 10s. per share was paid up. The Society commenced business by selling its members' milk on commission, but as it grew stronger it adopted the method of making contracts with the retail dealers on the one hand, and with its members on the other. The annual turnover has steadily increased until in 1908 it reached a total of £36,832 in milk alone, representing an average price of 8½d. per imperial gallon on approximately a million gallons sold, and a net profit of £700 was made. The average price paid to the members for milk was 8½d. per imperial gallon. The contract prices varied according to the distance from Stratford, from 1s. 7d. to 1s. 8d. per barn gallon in winter, and from 1s. 3d. to 1s. 4d. in summer. The carri-

age paid by the member varied from $\frac{1}{2}d.$ to $1d.$ per imperial gallon.

The Society has a representative in Stratford, London, who enters into negotiations with retail dealers throughout the East End of London, and makes contracts for the supply of certain quantities of milk. The contracts are usually half-yearly. The member enters into a contract with the Society to forward daily a certain quantity of milk to any station which the Society may specify. The contract does not lay down an absolutely fixed quantity, a margin of about ten per cent. being allowed. Thus, if a farmer thinks he can supply about 100 gallons daily he contracts to supply between 95 and 105 gallons. If he sends less than 95 gallons, and the Society to fulfil its contracts is obliged to purchase milk, the difference between the contract and the market price of the deficit is deducted from the farmer's account. If, on the other hand, he sends more than 105 gallons, he must accept whatever price the Society can obtain for the surplus.

The milk after being drawn from the cow is cooled to 60° F. It is strained either when being poured from the receiver to the cooler or in passing from the cooler into the churns in which it is to be consigned. No attempt is made to collect the milk, and the farmer takes it in his own cart to the station.

Part of the milk which is sent to Stratford is distributed by a "wholesale van" (the property of the Society) to retailers who desire to have milk delivered at their own places of business. The remainder is sold in the open market, either to retailers or to other wholesale dealers.

The Society's premises at Stratford are fitted up with refrigerating, cold storage, pasteurising and separating plant on modern lines. If on any day there is a glut in the market, and the Society finds itself with a surplus quantity of milk of which it cannot profitably dispose, it is pasteurised or put into cold store and held over until the following day, or it is separated if the Society happens to have at the time an outlet for cream.

With regard to the benefits which the farmers derive from membership of the Eastern Counties Dairy Farmers' Co-operative Society, the following is an extract from a letter

sent me by the manager. "It is not easy to state what is the increase in the price of milk due to the existence of this Society, but I believe that milk which at the time of its formation would frequently have been sold for 1s. 7d. per barn gallon in the winter months, and 1s. 2d. in the summer months, would now make as much as 1s. 8d. and 1s. 4d., and it is generally admitted by the farmers of Essex that this is largely due to the competition introduced into the wholesale trade by the Society."

One of the largest customers of the Eastern Counties Dairy Farmers' Co-operative Society is the Industrial Co-operative Society at Stratford. This is an interesting instance of the complete elimination of the middleman, the milk being sold direct from the organised producer to the organised consumer.

The Nidderdale Dairy Society is the name given to a Yorkshire co-operative society, the main business of which consists in the supply of fresh milk direct to consumers in the town of Harrogate in Yorkshire. The milk received from the members is delivered from house to house by the Society's employees, or is sold at a shop which has been opened. A considerable retail trade in cream, butter, cream cheese, eggs and bottled milk is also carried on. In 1908 the total sales of the Society amounted to £7,751, and made a net profit of £209, the average price paid to its members for milk being about 8d. per gallon.

The Yoxall Co-operative Dairy Society (Staffordshire) bought 199,557 gallons of milk during 1908, for which £5,028 was paid. Milk was sold to the value of £3,990, and cheese £2,690, leaving stock in hand £37. Whey was sold to the value of £68; the bulk of the cheese made was Derby or Leicester cheese. Last spring some utensils were acquired for the manufacture of Stilton cheese, and the outlay has been fully justified. They were bought primarily to deal with the milk which the cheese vats could not hold. The result of the manufacture of Stiltons has been that the Society has made a larger margin of profit on the manipulation of the surplus milk than they made on the bulk. The cheeses produced are bought by leading families in the district and by some wholesale firms. The situation of the factory, however,

is said to make it difficult to attract fresh buyers, and even the old customers can be retained only by the superior quality and condition of the commodity which is manufactured.

The Scalford Dairy, in Leicestershire, while not actually engaged in the sale of milk, affords another striking instance of what organisation can accomplish. The Society is situated at Scalford, near Melton Mowbray, and practically confines its operations to the manufacture of Stilton cheese. It began its career in 1903 by renting from the Duke of Rutland a disused malt house in the village of Scalford. This was put into thorough repair and altered to adapt it for use as a cheese factory. In the true co-operative spirit the members themselves carted all the materials used in the various alterations in the building, and they have since conveyed the cheese produced in the dairy to the station without charge.

The members enter into strict contracts with the Society in regard to the manner in which they supply milk to the factory. Further, the milk suppliers bind themselves that if a season's trading results in a loss, this shall be borne proportionately by each. It has, unfortunately, been found necessary to put this latter provision in operation as, owing to some bad debts, a loss was incurred in 1904. The milk suppliers, however, paid the levy required of them, and their loyalty was rewarded, for, though in 1905 there was a slight further loss, a substantial profit was shown in 1906, and the business is now on a thoroughly sound footing. The total turnover of the Society for the twelve months ending March 31st, 1909, was £3,400, and a substantial net profit was made. Their best make of cheese realises 1s. per pound.

The Scottish Agricultural Organisation Society.—Following fast on the footsteps of the English Agricultural Organisation Society, and improving on it in some respects, the Scottish Agricultural Organisation Society has been of late also devoting its attention to the organisation of milk-selling societies, and in the Annual Report of the Society for 1908 an account is given of the successful efforts now being made to organise the dairy industry on co-operative lines. "The milk depôts," says the report, "are highly successful,

and interest in this department of Agricultural Organisation is growing rapidly."

The Lugton and Dunlop Associations, formed under the Society's guidance, have substantially increased the price of milk in their respective districts, and their first half-year's operations show satisfactory profits after the cost of working and interest on capital have been met. A similar dépôt is in the course of erection at Fyvie, and negotiations for the formation of dépôts are in progress in Kirkcudbrightshire and Banffshire.

The Dunlop Co-operative Dairy Association handled an average of 1,255 gallons per day between May 1st and October 31st, 1909, and in the same period the total income was £6,763, and the total expenditure £6,454. The total number of gallons received in 1909 was 231,081, as compared with 213,450 in 1908. Of that quantity 84,049 gallons were made into cheese, which yielded £2,068 8s. 1d. An interesting point is that if this milk had been consigned to Glasgow the cost of railway carriage would have been £263 13s., whereas the cost of carriage of the cheese was only £14 3s.

Similar accounts were received from other Societies, and the Secretary of the Scottish Agricultural Organisation Society, in a letter that I received from him recently, estimated that the rise in price obtained had been fully 1d. per gallon, while he was hopeful that in the near future an increase of 2d. per gallon might be obtained; "but," he added, "1d. per gallon means to some of our district Associations a sum of about £1,500 per annum, so you can easily realise what potentialities there are in the development and organisation of the dairying industry. By organising the producing end of the business we eliminate risk of loss to the middlemen who are distributors in the big centres of consumption by giving them supplies to meet their requirements from day to day, instead of by the old system sending all the milk from the individual farms, whether the trader required it for his business or not. So far butter-making has not been attempted by any of our dépôts, as cheese-making has been found more profitable business. The cheese made at these co-operative dépôts during the past year was of first-class uniform quality, and commanded a relatively high price as compared with the

cheese made at the individual farms, where the quality is not uniform, and in many cases is inferior."

The number of co-operative dairies already set up by the Scottish Societies affiliated to the central body is five, though more are in course of formation. The building and equipment of a *depôt* generally costs from £1,500 to £2,000, and the cost of running it, including interest on capital, wages and other charges, works out at about $\frac{1}{4}d.$ per gallon of milk dealt with.

As an indication of the conditions on which these societies are formed, it may be useful to give a copy of the printed statement which is issued when the formation of a society has been proposed at a public meeting and a provisional committee has been selected.

Before proceeding with the scheme the Committee require a guarantee of the supply of the milk of not less than.....cows for a period of at least two years, and each member must undertake to supply such reasonable proportion during the winter months to the quantity supplied during the summer months as the Committee may deem desirable.

Each member must take at least one £1 Share in the concern, for which 5 per cent. interest will be paid out of the profits on the paid-up capital. In the event of any member leaving the district he will be relieved of this obligation should he so wish.

The milk will be paid for monthly according to the standard of quality, or otherwise as the members may decide, at the district market rates, and all profits accruing, after payment of interest on capital and working expenses, will be distributed amongst the members in proportion to the quantity of milk supplied in terms of the conditions stipulated in the Model Rules.

The milk will be delivered at the Creamery twice daily during the summer months, but once only during the winter months, at such hours as may be arranged. On Sundays it will be optional whether it is delivered once, twice, or not at all.

All milk must be of good quality, and must be delivered in a pure and good condition.

The sender shall not make any butter unless from the cream of milk retained for family use and the rearing of calves.

No mixed milk of two separate meals must be sent.

No milk must be sent from any cow that is not in good health, or that is under physic.

No milk shall be sent from newly calved cows for the space of four clear days after the day of calving.

The sender must undertake that in the event of any disease of a contagious or infectious nature occurring in his family, or in the families of any persons employed on the farm, or in charge of any of the cows, he shall at once stop sending the milk, and shall give written notice of the same to the purchasers or their Manager, who shall not resume taking the sender's milk until the person so affected and the premises

have been declared free of disease by the Public Health officials, and permission to resume taking the milk has been obtained by the purchasers or their Manager from the Local Authority of the place to which the milk was being sent.

Members who have a good water supply and appliances for the purpose of thoroughly cooling their milk at home might be relieved of the twice a day delivery except during very hot or sultry weather.

The milk will be delivered in vessels belonging to the members, and these can be washed and steamed at the Creamery and returned ready for use. Specially constructed tins, the property of the Society, will be used for conveying the milk to its destination.

A considerable saving in railway carriage is likely to be effected by a strong united effort towards that end, failing which by competitive motor transit.

The milk will be cooled and handled in the most approved method, so as to satisfy the most scrupulous Public Health Authorities. It is therefore likely to command not only a higher price but a more ready market.

At times when milk is plentiful and the demand slow, arrangements will be made for converting all surplus into first-class cheese or butter, thus relieving the market from over-supply and the seller or purchaser, as the case may be, from unavoidable loss.

In addition to buying the milk of members, the Society may also engage in the marketing of the eggs of the members, the profits arising therefrom being dealt with in the same way as the profits arising from the sale of milk.

A form of agreement is attached to the foregoing statement under which farmers agree to sell and deliver to the proposed Co-operative Creamery Society the whole of the milk produced on the farm, except what is required for home consumption, for a period of not less than two years. Stringent rules and regulations have also been drawn up by the Central Organisation for the guidance of committees and managers of the Dairy Societies.

It must be borne in mind in connection with the formation of the milk-selling societies that one cannot lay down a hard and fast plan. Different situations arise in different districts. In one centre the primary object may be a milk depôt for the treatment and distribution of milk, with a plant sufficient to deal with the manufacture of the surplus into cheese. At another centre the business may be partially a milk trade and partly the manufacture of products. In the scheme, therefore, for organising the society, and in the plan on which the depôt or depôts are to be erected and equipped, due allowance must be made for these varying conditions. For instance, some districts will be found where milk-selling will

be quite out of the question, and where cheese-making only in summer, and butter-making in winter, will be the plan to be adopted. In such places no expensive refrigerating plant will be necessary, as would be the case in those centres where milk-selling would be the primary object.

In conclusion it may be remarked that societies of this kind are to the advantage not only of the farmers of whom they are composed, but also of the general public as consumers. The organisation of the supply of milk to towns is, therefore, deserving of the attention of local authorities and medical officers of health, and I feel confident that they will find it to be to the interest of the consumer, as well as the producer, to use their influence to have such associations established in milk-producing areas.

The co-operation of municipal authorities with dairy societies and farmers would ensure those that understood the needs of the town being brought into direct touch with those engaged in the production of milk. The sanitary regulations to be observed could be decided after mutual discussion, and the necessity for these regulations would be better understood by the farmer, and more readily complied with, if they came from a body with which he was in direct communication.

SUGGESTIONS FOR PIG-FEEDERS.

(Continued.)

Mangolds.—Experiments in Denmark* showed that 8 lb. of mangolds gave practically the same increase as 1 lb. of grain.

At the Ontario Agricultural College† it was shown that rations composed of barley and middlings or maize and middlings were improved by the addition of pulped mangolds, more rapid and economical gains being obtained than with meals alone. A case is quoted‡ in which a large quantity of mangolds returned 26s. per ton when fed to pigs.

Turnips.—At the Canadian Central Experimental Farm mangolds were compared with turnips in 1901 (Coburn,

* W. A. Henry, *Feeds and Feeding*, 1906, p. 595.

† F. D. Coburn, *Swine in America*, 1909, p. 244.

‡ J. Long, *The Book of the Pig*, 2nd ed., 1906, p. 277.

op. cit., p. 240), both being fed to pigs in the pulped state in conjunction with meal and milk. The average daily gain was rather larger in the case of mangolds, but more mangolds were eaten per day. The result of the test may be given thus :—

Roots in ration.	Food per 100 lb. gain.			Average daily gain
	Meal.	Roots	Skim milk.	
Turnips	lb. 215	lb. 1,049	lb. 354	lb. 0.85
Mangolds	202	1,524	330	0.90

Carrots.—In 1892-94 experiments were conducted on nine different farms in Canada, and Henry states (p. 596) that carrots and mangolds containing equal quantities of dry matter had similar values for pigs. It is stated that in some instances carrots have returned 30s. per ton by being converted into pork.*

Boiled Potatoes.—In Henry's Wisconsin experiments boiled potatoes with maize meal were compared with maize meal alone, and it was found that 441 lb. of potatoes effected a saving of or produced the same gain as 100 lb. of maize meal.

Fjord's Danish experiments showed that 400 lb. of potatoes were about equal to 100 lb. of grain.

Clover and Lucerne.—Pigs cannot profitably be fed on a diet of green clover or lucerne only; when confined to or fed mainly on green forage they are liable to lose weight. Clover and lucerne have been found in America to be of great value as supplemental foods for pigs, and, compiling a table from the figures given by scientific observers, Coburn found that in America an acre of lucerne is worth for growing swine as much as six acres of average wheat, more than four acres of good oats, or $1\frac{2}{3}$ acres of good clover.

These figures do not hold true for Great Britain, but it may be said that, as shown in the table on p. 831, an acre of good clover is equal to nearly three acres of average wheat, and an acre of lucerne or rape to over $3\frac{1}{2}$ acres of wheat.

At the Kansas Station (Bull. 124, 1904), experiment

* J. Long, *op. cit.*, p. 277.

showed that for pork production 100 lb. of lucerne hay were about equal to 63 lb. of grain, or that one ton of lucerne hay would produce 235 lb. of pork, a figure much lower, however, than that attained in a previous trial.

Stewart found* that the addition of two quarts of short-cut clover to each day's ration of maize meal, the whole being wetted with hot water and allowed to stand ten or twelve hours before being given to the pigs, led to a considerable increase in the gains made compared with maize meal alone treated in the same way. Pigs of 75 lb. each in weight gained 110 lb. in 120 days when fed on maize meal only, but 143 lb. in the same time when the clover chaff was added to the ration. Henry says† "While the pig gets some nourishment from the hay, much of the advantage is doubtless due to the normal distension of the digestive tract effected by this material," as the pig is omnivorous by nature and suffers seriously if confined to cereals alone.

At the Oregon Experiment Station‡ it was found that one acre of good clover for growing hogs represented a value of about £9 5s.

Experiments were conducted in 1905 at the Central Experimental Farm, Ottawa,|| in which five lots of pigs were fed on a meal mixture of 500 lb. shorts, 30 lb. oil meal and 10 lb. gluten. In addition, one lot were pastured on lucerne, one

Fed for thirty-five days on mixed meal and	Average weight at start.	Average weight at end.	Average gain in thirty-five days.	Average daily gain.	Average food consumed (meal only).	Food per lb gain (meal only).
	lb.	lb.	lb.	lb.	lb.	lb.
Lucerne pasture ...	106	155	49	1'4	200	4'08
Red clover pasture	91	143	52	1'5	202	3'89
Roots in the field	102	149	47	1'31	200	4'26
Roots in pens ..	52	114	62	1'77	200	3'23
No extra food	50	100	51	1'45	240	4'71

lot on clover and one on roots, one lot were given roots in the pens, and one lot got no supplementary food. The roots were mangolds, sugar mangolds, sugar beets, carrots and turnips. The chief results are given in the table above.

* Henry, *op. cit.*, p. 577.

† Henry, *op. cit.*, p. 612.

‡ *Experiment Station Record*, 1904-5, p. 85.

|| *Experimental Farms Reports*, 1905, p. 71.

It will be observed that the most rapid gains were made by the pigs given roots in the pens, and these required the least meal per lb. gain. These pigs also made much the most economical gains, costing less per 100 lb. gain for meal and roots than any of the others fed on meal only. It was stated that "This method of feeding had a good effect on the form of the animals, making them come as near the ideal bacon type as could be desired."

In 1902 an experiment was conducted at Kansas Agricultural College Experiment Station to determine the value of lucerne and rape pasture for pigs.* Thirty pigs were divided equally and fed for 98 days (1) on grain, (2) on grain with rape pasture, and (3) on grain and lucerne pasture. The results were as follows:—

	Average daily gain	Total gain.	Grain consumed per 100 lb. gain.
	lb.	lb.	lb.
No pasture	1 04	1,023	371
Rape pasture	1 09	1,076	301
Lucerne pasture	1 10	1,078	300

It will be observed that both rape and lucerne largely reduced the amount of grain necessary to produce 100 lb. gain. Assigning the same value to the grain in each case, 202 lb. of increase must be credited to the rape in Lot 2, and 204 lb. to the lucerne in Lot 3. From the amount of pasture used and the current price of pork, it was shown that for pigs the rape was worth £2 10s. per acre, and the lucerne £5 2s. during the 98 days. The pasturing was considered not only economical from the standpoint of gains, but good for the pigs from the point of view of variety and health.

At Wisconsin Carlyle found† by experiment that while the gains with rape and clover were both satisfactory, the gains with rape were the best, in one experiment the average daily gains with rape being 1·27 lb. and with clover 1·22 lb., while the rape-fed pigs consumed 332 lb. of shorts and maize meal per 100 lb. gain, compared with 340 lb. in the case of the clover-fed animals, a difference of 8 lb. of meal in favour of rape. In other cases the difference in the grain required

* *Kansas Agric. Coll., Bull. 124, 1904.*

† *Wisconsin Expt. Sta. Report, 1902-3, p. 53.*

per 100 lb. gain was even greater, and on the average 33½ lb. in favour of rape. Carlyle found that for pig-feeding one acre of rape pasture had a feeding value of about £4 when fed with maize meal and shorts.

Oil Cakes.—Experiments conducted in Denmark in 1887-8 on 12 estates with 406 pigs fed with hemp-seed cake, sun-flower-seed cake, palm-nut meal, and peanut meal showed that 1 lb. of oil cake is no more than equal to 1 lb. of rye or barley.* In a subsequent trial, when less than half the concentrated food consisted of oil cake, the ration was nearly as effective as a pure grain ration, but with an increase of oil cake poorer results were obtained.

The residue from linseed crushing is regarded in America, according to Coburn,† as an excellent supplement to maize, and Shaw regards oil cake at the rate of 4 oz. per day as useful for sows for some time both before and after farrowing. It must, however, be used with care, some breeders considering that it will cause abortion if used excessively. Experiments at the Missouri Agricultural Experiment Station (1905-6)‡ showed that linseed oil-cake meal was more valuable than wheat middlings as a supplement to maize. Maize meal alone produced 100 lb. of gain for 556 lb. of grain, but when one part of linseed oil-cake meal was combined with five parts of maize meal, 100 lb. of gain were produced from 377 lb. of grain, and this result was borne out by three other tests.

In general, oil cakes and oil-cake meals, except in very small quantity, have not been found suitable for pigs.

Skim Milk.—This by-product of the dairy is one of the most valuable aids to the fattening of pigs, so much so that dairying and pig rearing are commonly said to go together. It is a well-known fact that it is largely the regular supply of skim milk and buttermilk that ensures the excellence and even quality of Danish bacon. Milk is usually fed in conjunction with cereal meals, and it is then that it is most effective. It may be taken as worth 1d. to 1½d. per gallon when used in this way, and experiment at the Wisconsin Station || showed that the best returns were obtained when

* Henry, *op. cit.*, p. 588.

† Coburn, *op. cit.*, p. 375.

‡ Coburn, *op. cit.*, p. 374.

|| Henry, *op. cit.*, p. 572.

used in the proportion of 1 lb. of meal to 1-3 lb. of skim milk, 327 lb. of skim milk then replacing 100 of maize meal. The average of all returns showed that 475 lb. of skim milk equalled 100 lb. of maize meal. In Denmark Fjord, using larger proportions of skim milk with grain, showed that the comparative value of grain and skim milk is expressed by the ratio 6 to 1, or that 600 lb. of skim milk were equal to 100 lb. of grain. The Wisconsin trials brought out the fact that when maize was valued at 18s. 8d. per quarter, skim milk was worth (when fed 1-3 lb. per 1 lb. of maize meal) about 1½d. per gallon for pig feeding, or when maize was valued at 28s. per quarter the milk would be worth 2½d. per gallon. The average value when fed with maize meal in different proportions, and maize at 28s. per quarter, was just over 1½d. per gallon. In these experiments machine-skimmed milk is referred to; hand-skimmed milk contains more fat, and is hence more valuable for pig feeding.

It is remarked by Coburn* that if a bushel of maize alone will make 10 lb. of pork, and 100 lb. of milk alone will make 5 lb. of pork, the two combined will on the average produce not 15 lb. but 18 lb. of pork, a gain of 3 lb., or 20 per cent., due to the combination. Experiments at the Utah Experiment Station showed the great advantage of the combined ration over grain alone or milk alone. The main results when the grain variously consisted of maize, wheat, and barley, and their products, may be given thus:—

	Average daily gain	Food eaten per 100 lb. gain		Gain per 100 lb. milk.
		Grain.	Milk.	
Milk and grain ..	lb. 1'27	lb. 292	lb. 768	lb. 23'2
Grain	0'91	470	—	—
Milk	0'68	—	3,312	14'2

This shows that when 100 lb. of milk were fed with grain they produced 23'2 lb. of gain, but when fed alone the gain was only 14'2 lb., a very considerable and important difference, while the daily gains with milk and grain were much larger, and fattening therefore so much the quicker.

* *Op. cit.*, p. 428.

Skim milk has also been compared with grain alone and with a mixed ration of skim milk and grain, and three results may be quoted * :—

Station.	Dry matter consumed per 100 lb. gain.		
	Milk alone.	Grain alone.	Grain and milk.
	lb.	lb.	lb.
Wisconsin	180	455	345
Colorado	—	576	298
Utah	298	421	334
Average	239	484	325.6

None of the pigs getting milk only attained over 100 lb. in weight, and milk alone is not suitable for pig feeding, but the result is an emphatic demonstration of the superiority and economy of grain and milk over grain alone.

In 1904 experiments were made at the Central Experimental Farm, Ottawa,† young pigs varying from 43 to 80 lb. in weight being fed on a number of different rations. In each case the best and most economical gains were made by the lots in which skim milk formed part of the ration. The chief results of the most economical lots may be given thus :—

	Ration.	Days fed.	Average weight at beginning.	Average weight at end.	Food per 100 lb. gain.	Average daily gain.	Cost of 100 lb. increase
Lot 1	Ration composed of 200 parts oil meal, 200 shorts, 200 gluten, 200 oats, with 4½ lb. skim milk per head per day	40	lb. 36.5	lb. 63	lb. 190 meal } 564 milk }	lb. .66	s. d. 12 3
Lot 2	Shorts Skim milk	40	30.5	64	152 meal } 564 milk }	.84	9 2
Lot 3	Shorts, 400 Oil meal, 100	60	45.25	81	280	.6	11 8
Lot 4	Half shorts and half mixed oats, peas, and barley	90	75	181.25	438	1.17	18 3
Lot 5	As Lot 4, with sour skim milk	90	45	153	295 meal } 309 milk }	1.2	14 3

* U.S. Dept. of Agric., Bureau of Animal Industry, Bull. 77, p. 144.

† Experimental Farms Rept., 1904, p. 72.

An experiment at Wisconsin* showed that when skim milk was added to the ration the pigs ate much larger quantities of grain and made much greater daily gains, thus bringing about more rapid fattening. For four weeks the ration consisted of ground maize, ground rye and shorts in equal parts, and then skim milk was added for seven weeks. During the former period cross-bred pigs consumed 566 lb. of grain per 100 lb. of gain, but during the latter only 331 lb. of grain, each 100 lb. of skim milk then used saving 6.26 lb. of grain.

Investigations at the Central Experimental Farm, Ottawa,† showed that for young and growing pigs skim milk may with advantage and economy form the largest part of the ration, but for fattening pigs averaging over 100 lb. live weight it is economical to give not more than 5 lb. of skim milk per head per day, as it is found to give the best return when it constitutes but a small part of the total ration. Skim milk was considered to be worth one-sixth to one-eighth as much as mixed grain.

Jordan calculates,‡ on the basis of Henry's experiments, that in a ration composed of maize meal and skim milk, the greatest efficiency is obtained with 1 lb. of the meal to 1-3 lb. skim milk, and other experiments give similar testimony. The authority quoted says that "probably no combination has been found more satisfactory for all-round use than skim milk, wheat middlings, and corn (maize) meal, the latter constituting the larger proportion of the grain food." He deprecates, however, the excessive use of maize, although considering it second to no other grain if properly reinforced with more nitrogenous foods.

Sour Skim Milk.—Experiments at the Vermont Experiment Station|| appear to show that there is little difference as regards feeding value for pigs between sweet and sour skim milk, but there was perhaps a slight difference in favour of sour milk. In two trials with quite young pigs the food eaten for 100 lb. gain was as given in the table on the next page.

Scheven found § that 100 lb. of gain were produced by 1,613 lb. of sweet or 1,545 lb. of sour skim milk.

* *Wisconsin Exp. Sta. Rept.*, 1902-3, p. 36.

† Jordan, *Feeding of Animals*, p. 364.

|| Coburn, *op. cit.*, p. 438-9.

† *Bull. No. 33*, 1899.

§ Henry, *op. cit.*, p. 571.

Feed.	Average weight of pigs at commencement	Food per 100 lb. gain.	
		Milk.	Grain.
I.	lb.	lb.	lb.
Sweet Skim Milk ..	16	1,280	198
Sour Skim Milk	17	1,144	177
II.			
Sweet Skim Milk	31	1,009	220
Sour Skim Milk ..	29	1,000	218
Average :			
Sweet Skim Milk	23.5	1,144.5	209
Sour Skim Milk ...	23	1,072	198

Buttermilk.—The composition of buttermilk approximates so closely to that of skim milk that they may be considered to be of about equal feeding value. This was shown by experiment at the Massachusetts Experiment Station,* where 100 lb. of gain was obtained by the use of 1,351 lb. buttermilk and 116 lb. of maize meal, against 1,390 lb. of skim milk and 115 lb. of maize meal. Undiluted buttermilk should be used, and for fattening pigs in the proportion of about 1 gallon of buttermilk to 5 lb. of meal.

Whey.—This by-product of cheese-making is much less valuable for pig-feeding than either skim milk or buttermilk, but it contains a considerable amount of milk sugar, and is therefore most useful for use with meals. In Fjord's Danish experiments† with whey from the manufacture of skim milk cheese from separated milk, 1,200 lb. of whey were found equal to 100 lb. of meal, but the average of experiments at the Wisconsin Station and at the Ontario Agricultural College with whey from the manufacture of whole milk cheese showed that 785 lb. of whey were equal to 100 lb. of meal. On this basis whey would be about half the value of skim milk or buttermilk. Later experiments at the Ontario Experimental Farm‡ showed that sour whey gave almost as good results as sweet whey, and that fermentation does not seriously detract from the value of the whey as a food for pigs. Two to 2½ lb. of whey are recommended to 1 lb. of meal.

* Coburn, *op. cit.*, p. 438-9.

| Henry, *op. cit.*, p. 574.

‡ Coburn, *op. cit.*, p. 442.

USEFUL RATIONS.

A few rations which have been found valuable and practical in the United States, Denmark, and Germany may be given here with advantage, and it would be of much interest if pig-feeders in Great Britain would make careful comparisons between these rations and those used for their own pigs, and, after making practical trials side by side with such, would report the results to the Board.

UNITED STATES.

*For pigs of 20-60 lb.**

1. $\frac{3}{4}$ lb. maize meal per gallon of skim milk.
2. A mixture of $\frac{1}{2}$ maize meal, $\frac{1}{2}$ bran, and $\frac{1}{2}$ gluten meal, with skim milk at disposal.

For pigs of 60-100 lb.

3. $1\frac{1}{2}$ lb. maize meal per gallon of skim milk.
4. A mixture of $\frac{1}{2}$ maize meal, $\frac{1}{4}$ bran, and $\frac{1}{4}$ gluten meal, with skim milk at disposal.

For pigs of 100-180 lb.

5. 2 lb. maize meal per gallon of skim milk.
6. A mixture of $\frac{2}{3}$ maize meal, $\frac{1}{3}$ bran, and $\frac{1}{3}$ gluten meal, with skim milk at disposal.

For pigs 2-6 months old.†

7. Maize meal, 3-5 lb. per head per day, with lucerne forage or pasture.

The following rations may be used at the rate of 1-2 lb. per day for pigs of 20-60 lb. live weight, 2-3 lb. per day for pigs scaling 60-100 lb., or 3-4 lb. for pigs weighing 100-150 lb., less meal being always given when skim milk is available. In general it is best not to give pigs a certain quantity of food, but to allow them at each meal as much as they will clear up. All parts are by weight.

8.—Maize meal	2 parts.	11.—Shorts	3 lb.
Barley meal	1 part.	Skim milk or butter-	
Shorts	1 "	milk	1 gall.
9.—Barley meal	4 parts.	12.—Maize meal	3 parts.
Shorts	1 part.	Ground oats	1 part.
		Barley meal	1 "
10.—Maize meal	2 parts.	Pea meal	1 "
Crushed Oats	1 part.	Mangolds or Turnips (pulped)	
Skim milk	5 parts.	Skim milk.	

In the case of Ration No. 12, 1 lb. of gain was made at a cost for food of 2 lb. of the mixed meal, 15 lb. of mangolds and 3.3 lb. of skim milk (9 lb. daily gain being obtained on a ration of 1.8 lb. meal, 14 lb. mangolds and 3 lb. skim milk.)

13.—Meal	1 lb.	14.—Oats, barley and peas,	
Cooked potatoes	7-8 lb.	whole, and soaked	54
Skim milk	3 lb.	hours	3½ lb.
		Skim milk	3 lb.

* U.S. Dept. of Agric., Bureau of Animal Industry, Bull. 47, pp. 146-7.

† Do.; Bureau of Plant Industry, Bull. 111.

15.—Meal	...	...	2 lb.	16.—Ground barley, soaked	54
Cooked potatoes	...	...	5 lb.	hours	...
Skim milk	...	...	2 lb.		4½ lb.

The last four rations are given per head per day for pigs of 100–160 lb. They have produced daily gains of 1 lb. or over.

DENMARK.*

Ration 1.	Shorts	...	..	...	2 parts.
	Ground barley	..	...	...	2 "
	Maize meal	...	...	...	1 part.
	Skim milk.				
Ration 2.	Ground barley	...	..	...	2 parts.
	Wheat bran	...	.	...	1 part.
	Ground rye	...	...	...	1 "
	Skim milk.				
Ration 3.	Ground barley	...	...	..	2 parts.
	Ground oats	..	...	...	1 part.
	Maize meal	...	...	...	1 "
	Skim milk.				

GERMANY.†

Ration 1.	Ground barley	..	...	...	1 part.
	Ground rye	..	...	...	1 "
	Maize meal	...	...	...	1 "
Ration 2.	Ground barley	...	...	...	2 parts.
	Ground wheat	...	.	...	1 part.
	Ground rye	...	...	...	1 "
Ration 3.	Ground barley	...	...	...	1 part.
	Maize meal	...	.	...	1 "
	Cooked potatoes and a little skim milk towards the end of fattening.				

The following rations‡ are for pigs of varying ages, and each is sufficient for 10 pigs:—

	Age of Pigs	Average Weight of Pigs	Ration.
Ration 4	2–3 months	44 lb.	Skim milk 44 lb, ground barley 9 lb., ground maize, 4½ lb, ground peas 2½ lb.
Ration 5	" "	"	Skim milk 44 lb., potatoes 22 lb., ground barley 5½ lb., bran 4½ lb., linseed cake 1½ lb.
Ration 6	3–5 "	110	Skim milk 66 lb, potatoes 88 lb., ground barley 6½ lb., ground maize 6½ lb., linseed oil-cake meal 4½ lb.
Ration 7	" "	"	Mangolds 88 lb., rye meal 22 lb., whey 132 lb., linseed cake 4½ lb.
Ration 8	5–6 "	143	Potatoes 110 lb., skim milk, 88 lb, ground barley, 13½ lb., earth-nut meal 2½ lb.
Ration 9	6–9 "	198	Potatoes 165 lb., skim milk 110 lb., rye bran 11 lb., ground barley 6½ lb.

* U.S. Dept. of Agric., Bureau of Animal Industry, Bull. 77, p. 94.

† Do., p. 97.

‡ O. Mentzel v. A. von Lengerke, *Landw. Kalender*, 1908, p. 133.

It will be useful to compile a final table showing the approximate estimated (theoretical) value for pig-feeding of the various average crops produced on one acre in Great Britain. For the sake of comparison the quantities of skim milk, buttermilk, and whey necessary to produce 1 lb. of pork are also given.

Crop	Gross produce per acre	No of lb per 1 lb of pork *	Pork per acre	Value of pork at 6d per lb	Percentage comparison	
A {	Wheat	31 bus of 60 lb	lb. 4 5	lb 413	£ s d 10 6 6	Wheat = 100. 100
	Barley	33 " 55 "	4 5	403	10 1 6	97 5
	Oats	39 " 40 "	4 5	346 5	8 13 3	83 9
	Beans	30 " 64 "	4 5	426 5	10 13 3	103 2
	Peas	27 " 64 "	4 5	384	9 12 0	92 9
B {	Potatoes	6 tons	20	672	16 16 0	Potatoes = 100 100
	Mangolds	19 "	36	1,182	29 11 0	175 8
	Turnips	13 "	36	808	20 4 0	120 2
	Carrots	15 "	36	933	23 6 6	138 8
	Lucerne	10 " (green)	15	1,493	37 6 7	222 2
	Clover	8 " "	15	1,194	29 17 2	177 7
	Rape	10 " "	15	1,493	37 6 7	222 2
C {	Skim milk	20 to 30				
	Buttermilk	20 to 30				
	Whey	50				

* Coburn takes as a comparative basis 4 lb of grain or 15 lb. of green clover or lucerne as producing 1 lb of pork.

It must be pointed out that while the grain foods mentioned in section A of the table may be fed alone or in combination and form the sole food of the pig, the root and fodder crops (section B) can only be employed in conjunction with cereal food, for they form little more than a maintenance ration when fed alone. While, therefore, the figures in section A may be taken as approximately real, those in section B are theoretical, and show the comparative values for pig-feeding of the seven crops mentioned. When fed in conjunction with a suitable quantity of grain, the root and fodder crops will, as already stated, form a useful portion of the ration, and may be expected to produce pork at the approximate rate mentioned in the third column.

WINTER WASHING OF FRUIT TREES AND THE TREATMENT OF NEGLECTED ORCHARDS.

IN dealing with the question of the regeneration of neglected and worn-out orchards, the most which can be hoped for is to repair to some extent the injury caused by age or neglect, for it is futile to expect that any course of treatment will succeed in entirely remedying previous mismanagement. The results obtained will depend largely upon the local conditions; in some cases a very considerable improvement will be brought about, but in other instances the results may be somewhat disappointing. Where the orchards are prematurely worn-out, or otherwise unsatisfactory, benefit may be safely anticipated; but where the decay is natural and due mainly to old age, it is probable that nothing short of entire replanting will suffice.

The measures to be adopted consist in the thorough cleansing of the trees and the combating of insect and fungus pests by means of winter washing, summer spraying, and similar treatment, together with manuring, pruning, re-grafting unsatisfactory trees, and replanting.

Winter Washing of Fruit Trees.—A neglected orchard not only harbours during the winter all manner of insect enemies which commence their ravages in spring, but forms a nursery or breeding-ground from which other orchards are infested with noxious insects. The first step, therefore, is to destroy these pests as far as possible, and for this purpose winter washing is practised.

The caustic or burning wash applied clears away moss, lichen and other vegetable growths that are not only harmful to the health of the tree, but which also act as shelter-places for injurious insects, while at the same time the wash may reach the insects themselves in their various stages of development.

The woolly aphid, the apple blossom weevil, the earwig, the caterpillar of the codling moth in its cocoon, and other insects, are found during the winter sheltering under cover of rough bark and of lichenous and other growths on fruit trees. The destruction of their winter quarters places such insects at a disadvantage, and their number is in conse-

quence materially reduced. Further, some of the insects are killed by the wash itself.

It has been found in practice that a wash used with effect against an insect in its adult, larval, or pupal stage, may prove quite ineffective against the egg of the insect, and hence winter washing should be followed by careful observation in spring, so that young, newly-hatched insects may be dealt with—according to their kind—before they have had time to do great harm or to multiply.

Formula for Winter Wash.—The materials necessary for the new caustic winter wash are: Caustic soda (98 per cent.), sulphate of iron, lime, paraffin, and water.

In the revised leaflet (No. 70) issued two years ago (January, 1908), an emulsion-soda wash composed of paraffin, soft soap, caustic soda and water was recommended. As a result of experiment, an improvement has been suggested by Mr. S. U. Pickering, F.R.S., Director of the Woburn Experimental Fruit Farm, whose formula is now recommended, viz.: Iron sulphate, $\frac{1}{2}$ lb.; lime, $\frac{1}{4}$ lb.; caustic soda, 2 lb.; paraffin (solar distillate), 5 pints; and water to make 10 gallons.

In order to prepare the wash the iron sulphate should be dissolved in about 9 gallons of water. The lime should then be slaked in a little water and well stirred, a little more water being added to make a "milk." The "milk" of lime should next be run into the iron sulphate solution through a piece of sacking or a fine sieve, to remove grit or coarse particles. The paraffin should then be added and the mixture churned thoroughly. Just before using, the caustic soda, in the powdered form, should be added to complete the "wash."

This wash, which has both a cleansing property and an insecticidal value, is recommended for application while the trees are dormant, and certainly before the buds have burst. Perhaps the greatest advantage would result from such a wash if applied about the beginning of February.

Note.—As the wash has a burning effect on the hands, care should be exercised in employing it. Rubber gloves are sometimes used to protect the hands, but these should be so secured that the wash cannot run in under the rubber. The face, the eyes especially, should also be protected.

.It is advisable not to allow live stock in grass orchards for a week or two after spraying.

Effect of Caustic and Other Washes on the Health of the Sprayed Plants.—Comparatively few exact experiments have been conducted to discover how caustic washes affect the health of the plants themselves. Complaint is sometimes made that the plants suffer severely, and with constantly repeated washings this may be true. The winter wash above recommended need not be applied annually, but only at intervals of some years.

Manuring.—When fruit trees begin to bear freely it is essential, if free growth is to be maintained, that they should be regularly manured, to compensate for the demands made upon them by the production of the crop. If left unmanured, the soil is bound sooner or later to show signs of exhaustion, and the further development of the trees will be checked. In order that both growth and fruitfulness may continue the tree must be able to draw from the soil the necessary amounts of nitrogen, phosphoric acid, potash, and lime. A free supply of each of these substances is required, nitrogen and potash being particularly needed for the development of new growth, while phosphoric acid and lime play an important part in the production of fruit of a good quality. Lime in conjunction with potash is also of the greatest service in developing hardness and enabling the trees to resist canker.

The extent and nature of the manuring required must be determined by the character of the soil and by the special circumstances of each case, but our knowledge as to the best forms in which to apply the various essential constituents is at present far from complete.

If growth requires to be forced, nitrogen and potash should be used freely, the former especially, in a condition quickly available for the trees. Probably some distinction should be made in this particular between grass orchards and trees in cultivated ground. In grass orchards a more or less regular supply of nitrogen is provided by the stock utilising the orchards for grazing purposes, whereas in the case of tilled soil the only source of nitrogen, other than the atmosphere or manure directly applied, is the decaying vegetable matter returned to the soil by weeds and falling leaves. In cultivated

orchards, moreover, nitrification probably proceeds more rapidly than in those on grass land. Hence, in the latter, nitrogen in the form of nitrate of soda or sulphate of ammonia seems preferable to organic nitrogen; whereas organic manures may be of equal value for cultivated soil. Where nitrate of soda is used, it should be applied in the spring.

As a potassic manure, sulphate or chloride of potash may be recommended; the latter should only be used on soils rich in lime. Kainit is considered by some authorities to be unsuitable for fruit.

Phosphoric acid is generally best supplied in the form of basic slag, except where immediate effect is required, in which case superphosphate should be used, and supplemented later with slag.

Lime may be applied as quicklime, slaked lime or chalk, the last being safer if it is likely to be brought at once into contact with the delicate rootlets. As a surface-dressing the other two are perfectly safe.

Lime, phosphoric acid, and potash may be applied in autumn, winter or spring. In cultivated soil the manures may be applied as a surface-dressing and then worked into the ground, but in grass orchards this method is slow in producing effect. To produce quicker results a series of small holes may be drilled in the ground in the neighbourhood of the young roots, or strips of turf may be temporarily removed in the same region, and the manure incorporated directly with the soil. The quantity of manure required should be varied according to the size of the tree. Since in the case of trees some time is required for the manure to make its effect visible, it should not be concluded that the application has had no result if no response is apparent during the first season.

Stock should be regularly turned into the orchards for grazing, since they are able to supply considerable quantities of nitrogen as manure. The practice of turning in pigs during the winter is useful, for they not only improve the soil by the addition of manure, but by bringing about its aeration by constant grubbing, while they also destroy many larvæ and pupæ of insects.

Pruning.—If a young standard tree is properly pruned for

the first five or six years after planting, it will require very little attention in that respect later. It should be gone over each year, all surplus wood being thinned out, and interlacing or diseased branches cut away. Non-observance of this practice will result eventually in the development of a head of densely tangled and diseased branches, examples of which are to be found in nearly all old orchards. The extent to which this condition may be remedied by careful pruning depends very largely upon the individual trees. If, for example, a tree is very old, the amount of wood which ought to be cut out is generally so great that its removal seriously weakens the tree, and may even kill it. In dealing with old trees it is necessary that the greatest care should be taken not to remove too much wood at one time. It is better to spread the operation over two or even three seasons than to cripple the trees by too severe pruning.

With many full-grown trees the requisite thinning-out of the wood cannot be accomplished except by the removal of many of the larger branches, with the result that a very large portion of the head, and especially of the fruiting wood, is lost. When pruning is being done, therefore, these facts should not be overlooked. As much surplus wood and interlacing and diseased branches as can be spared should be cut out, and particular attention should be given to thinning in such a manner that the fruiting wood is freely exposed to air and sunlight. Extra time spent in removing dead and diseased twigs will be profitably occupied, for it is on such parts that some of the most serious fungus pests, such as the brown rot and apple scab fungi, pass the winter stages of their life history, and in the following spring break out into active growth and produce another epidemic of infection.

All prunings should be burnt immediately, in order to destroy insect and fungus pests; the ashes should be distributed over the soil as manure.

Regrafting.—In cases where trees of existing varieties prove to be unsatisfactory, they may often with advantage be headed back and grafted with more suitable sorts. Dessert varieties which may be recommended for propagation under such circumstances are Worcester Pearmain, Duchess of Oldenburgh, Cox's Orange Pippin, and Allington Pippin,

if the original trees are vigorous growers; and Ecklinville, Newton Wonder, Warner King, and Bramley's Seedling are suitable culinary kinds. There is some risk in regrafting, since occasionally the operation results in the death of the tree at once, the grafts failing to develop; while at other times, after apparently satisfactory growth has followed for two or three seasons, the tree may suddenly die.

Replanting.—Although the planting of young trees in old orchards is not a practice to be recommended if fresh land can be obtained instead, growers are frequently obliged to fill up gaps in old orchards. If the orchard concerned is composed almost entirely of old trees, likely to die in the course of a few years, the young trees planted to replace the others, as the vacancies arise, should as far as possible be placed so as to fall into proper positions relatively to the remaining young trees, when the old trees have been entirely replaced. Where gaps are to be filled in comparatively young orchards there is not generally the same degree of choice, since the existing trees may last for several years and the available area for the selection of a site is therefore restricted within narrow limits. In any case, however, it will be well if each new tree can be planted in such a way that it will not occupy the same spot as its predecessor; and in such instances the planting may be done in the usual manner.

Where, however, the new tree must occupy the same ground as the old, special preparation of the soil should be attempted. The roots of the old tree should be first removed as completely as possible so that no decaying wood be left in the soil, and a circular hole, at least 6 feet in diameter and from $1\frac{1}{2}$ to $2\frac{1}{2}$ feet in depth, should be dug and left open to atmospheric influences as long as possible before the tree is planted. The soil may also be sweetened and freed from insect and fungus pests by a dressing of quicklime. If fresh soil can be substituted for that dug out, the newly-planted tree will have a better opportunity to flourish. Should the orchard happen to be on grass land it will be an aid to the tree also if the grass be not allowed within three or four feet of it for the first few years after planting.

IMPORTS OF AGRICULTURAL PRODUCE IN 1909.

The total value of the principal articles of food imported into the United Kingdom in 1909 was £191,522,000 as against £183,955,000 in 1908, £188,353,000 in 1907, £181,604,000 in 1906, and an average of £177,047,000 in the three years 1903-1905. These figures represent the value (cost, insurance, and freight), as declared to the Customs officers at the port of arrival, of the grain and flour, meat and animals for food, butter, cheese, eggs, condensed milk, fruit and vegetables, hops, lard, and margarine, which may be grouped together as agricultural food products in the sense that they compete more or less directly with the home supply.

The increase in value during the past year has been due partly to the substantial rise in the price of wheat and wheat flour, and partly to the somewhat larger quantities of grain and grain products which have been imported, the total value of the items included under the general heading of grain and flour amounting to no less than £83,123,000, as compared with £72,733,000 in 1908. On the other hand, the value of meat (of all kinds) was less than for several years past, viz., £47,624,000, a figure which may be compared with the total for 1908 of £49,448,000, and with the still higher total of just over £52,000,000 in 1906.

It may be noted that, owing to a change in the Trade and Navigation Accounts, where the countries are mentioned in this article the figures represent goods *consigned* from the countries stated, and not, as in the corresponding article last year, merely the goods *received* or shipped from the countries named.

Cattle and Beef.—The importation of live cattle into the United Kingdom for food has been declining since 1905, and during the past year it fell to a lower figure than in any year since 1887. This was to a small extent attributable to the existence of foot-and-mouth disease in the United States, in consequence of which importation from certain ports was prohibited during part of the year.

The diminution in the supply of live meat, however, was made up by an increase in the quantity of fresh and refrigerated beef received. This larger supply came chiefly from

Argentina and, to a smaller extent, from Australia and New Zealand, the receipts of beef from the United States, like those of live cattle, being relatively small, and only amounting to 857,000 cwt., as compared with 1,447,000 cwt. in 1908, and 2,454,000 cwt. in 1907. The trade returns distinguish for the first time between fresh, chilled, and frozen beef, and 831,000 cwt. of the United States beef is returned as chilled, at an average value of 45s. 9d. per cwt. The largest quantity of chilled beef, viz., 1,827,000 cwt., was received from Argentina, but was of lower quality, having an average value of 36s. 8d. per cwt. Argentina is also the main source of the supply of frozen beef (2,382,000 cwt.), though the imports from Australia (409,000 cwt.) and New Zealand (454,000 cwt.) were of some importance.

The imports of fresh beef amounted in all to 6,141,000 cwt., while the weight of beef represented by the imports of cattle may be estimated at 2,076,000 cwt., so that the total receipts of meat of this class from abroad in 1909 were 8,217,000 cwt., or about 20½ lb. per head of the population. In 1908 the figures were 8,115,000 cwt., representing 20½ lb. per head; in 1907 8,806,000 cwt., or 22½ lb. per head; and in 1906 9,170,000 cwt., which was equal to 23½ lb. per head.

Sheep and Mutton.—For some years past, the imports of live sheep have been declining, and in 1909 sheep almost ceased to be imported at all; the number received being only 8,131, a figure which may be compared with the 382,000 imported in 1904.

Fresh mutton is almost entirely imported in a frozen state, and comes chiefly from Argentina (1,437,000 cwt.), New Zealand (1,978,000 cwt.), and Australia (944,000 cwt.). The receipts from the two latter countries were rather higher than in 1908, but there was a small decline from Argentina.

The total imports of fresh and refrigerated mutton amounted to 4,762,000 cwt., while the weight of meat represented by the sheep received alive may be estimated at 4,400 cwt., so that the total receipt of fresh mutton from abroad in 1909 was 4,766,000 cwt., or nearly 12 lb. per head of the population. In the two previous years the figures were 4,434,000 cwt. and 4,649,500 cwt. respectively, or about 11 lb. and 11½ lb. per head of the population.

The receipts of fresh mutton in the past year were the largest on record, exceeding by nearly 200,000 cwt. the total for 1907, so that, notwithstanding the falling-off in the supply of live sheep, the total quantity of mutton imported from abroad was larger than in any previous year.

The declared value of the fresh mutton was 32s. 11d. per cwt., which was about 5s. per cwt. less than the values of the previous three years, and the lowest figure since 1899.

IMPORTS of Live and Dead Meat.

Description.	Quantity.		Value.	
	1908.	1909.	1908.	1909.
	Number.	Number.	£	£
Cattle	383,129	321,341	6,549,285	5,566,122
Sheep	78,900	8,131	122,525	12,923
Swine	—	—	—	—
Total live animals ..	—	—	6,671,810	5,579,045
	Cwt.	Cwt.		
Beef, fresh ..	5,611,441	6,141,111	10,276,957	10,294,198
„ salted ..	114,742	110,015	215,225	196,238
Mutton, fresh ...	4,385,771	4,761,838	8,140,029	7,839,195
Pork, fresh ...	572,222	428,344	1,331,435	1,023,322
„ salted ...	270,608	258,539	328,851	312,862
Bacon	5,685,742	4,625,463	14,480,579	13,801,665
Hams	1,225,227	1,129,029	3,084,669	3,112,896
Meat unenumerated—				
Fresh... ..	697,814	698,801	1,188,934	1,276,009
Salted	73,978	55,601	107,957	98,645
Meat, preserved ...	465,638	609,984	1,883,555	2,333,404
Rabbits, dead ...	550,928	579,856	685,448	727,954
Total dead meat ...	19,654,111	19,398,581	41,723,639	41,016,388
Poultry and game ...	—	—	934,679	920,699

Bacon.—Owing chiefly to the high price of bacon and the scarcity of pigs in the United States, the imports fell off to a substantial extent, being lower than in any year since 1896. The United States sent 2,189,000 cwt., as against 2,858,000 cwt. in 1908, Denmark 1,810,000 cwt., as against 2,050,000 cwt., and Canada 443,000 cwt., against 688,000 cwt. in the earlier year. The declared average value was 59s. 8d. per cwt., which was 8s. 9d. higher than the value in 1908. The average value reached during the past year is the maximum attained in a period of nearly 40 years, as it has not

been exceeded since 1870, when the computed average value of the imports of bacon was 62s. 10d. per cwt.

Poultry and Game.—Poultry is chiefly received from Russia, United States, France, and Austria, and the figures of value exhibit no great change as compared with the previous two years. Russia's share in the trade amounted to £352,000, that of the United States to £150,000, and that of France and Austria to £156,100 and £108,800 respectively, out of a total for this item of £921,000.

The value of the imported game was £108,100, which is less than the total of earlier years.

Total Imports of Meat.—Converting the live animals into their equivalent weight of meat and adding the total imports of dead meat of all kinds (excluding poultry and game), it appears that this country consumed, in addition to the home supply, some 21,479,000 cwt., as compared with 22,205,000 cwt. in 1908 and 22,586,600 cwt. in 1907. The total value credited to the different kinds of live and dead meat, including poultry, was £47,624,000, as compared with £49,448,000 in 1908, £51,888,000 in 1907 and £52,026,000 in 1906.

IMPORTS of Dairy Produce, Margarine, and Eggs.

Description	Quantity.		Value.	
	1908	1909	1908.	1909.
	Cwt	Cwt	£	£
Butter	4,210,821	4,062,833	24,080,912	22,425,067
Margarine	813,447	868,292	2,081,245	2,243,737
Cheese	2,306,086	2,390,090	6,684,203	6,829,963
Milk, condensed	920,210	991,378	1,606,509	1,731,829
	Great hundreds.	Great hundreds.		
Eggs	18,210,070	17,710,441	7,183,112	7,235,302

Butter.—The receipts of butter were somewhat less in the past year than in 1908, though the variation was not great. The exports from Denmark (1,764,000 cwt.) kept about the same level as in several previous years, but those from Russia (601,700 cwt.) and Holland (148,600 cwt.), showed some falling off. The Colonies of Victoria, New South Wales, Queensland, and New Zealand sent 663,000 cwt., as against

621,000 cwt. in 1908 and 895,000 cwt. in 1907. The average value of the imported butter was 110s. 4d. per cwt., or 4s. per cwt. less than the value in 1908.

Cheese.—The supply of cheese remained at about the same level as in the past two years, Canada furnishing 1,567,000 cwt., or about two-thirds of the total. The imports from New Zealand (368,500 cwt.) showed an increase, and that country is now the second largest exporter.

Eggs.—An interesting feature in the egg trade is that the imports have now been for five years below the figures reached in 1903 and 1904, and this may possibly indicate that with the extension of poultry-keeping in this country a greater portion of the supply is being provided from our home resources.

The decrease in the supply during the past year was due to diminished receipts from Denmark, Germany, Italy, and Austria, while the receipts from Russia and France increased.

IMPORTS of Grain and Flour.

Description.	Quantity.		Value.	
	1908.	1909.	1908.	1909.
	Cwt.	Cwt.	£	£
Wheat	91,131,205	97,854,825	38,295,327	45,286,798
„ meal and flour ...	12,969,855	11,052,540	7,075,231	6,370,488
Barley	18,137,200	21,556,470	6,113,945	7,143,849
Oats	14,269,250	17,840,498	4,162,576	5,439,484
Oatmeal	500,698	583,125	416,134	465,118
Maize	33,841,000	39,362,605	10,388,061	12,122,272
„ meal	450,410	334,140	159,484	127,751
Peas	1,060,999	1,314,149	538,313	603,054
Beans	1,043,997	2,171,230	373,018	757,600
Other corn and meal ...	1,618,181	1,626,296	682,289	677,547
Total	—	—	68,204,378	78,993,961

Grain and Meal.—The imports of grain and meal during the cereal year ending 31st August, 1909, were dealt with in this *Journal* in September last. The table above shows the receipts during the calendar year, and it may be noted that the imports of wheat exceeded, both in quantity and value, those of any previous twelve months, though the quantity was only slightly in excess of that received in 1904 and 1905. The value, on the other hand, was nearly £7,000,000 higher

than in 1908, the previous highest year. The leading sources of supply were Argentina (20,038,000 cwt.), Russia (17,848,000 cwt.), United States (15,504,000 cwt.), India (14,633,000 cwt.), Canada (16,616,000 cwt.), while Australia and New Zealand together accounted for 10,400,000 cwt. The receipts of flour were less than in 1908 owing to a falling off from the United States.

The average value of the imported wheat was 9s. 3d. per cwt., a figure which is much in excess of anything recorded in recent years. Flour is also higher, but the variations in barley, oats and maize were unimportant. Barley showed an increase as compared with the three previous years. The principal contributors were Russia (9,766,000 cwt.), Turkey (2,036,000 cwt.), Roumania (2,288,000 cwt.), and the United States (2,723,000 cwt.).

Oats amounting to 17,840,000 cwt. were imported in 1909, as against 14,269,000 cwt. in 1908. Russia (7,323,800 cwt.) and probably Argentina were the two chief sources of supply. Argentina has only recently assumed a position of importance in this trade and is included among "other countries" (unspecified), the import from which amounted to 7,002,000 cwt. Germany furnished 2,147,000 cwt., while nothing came from the United States, which in some years has figured in the returns to a substantial extent.

The supply of maize (39,363,000 cwt.), though small, was greater than in 1908. Argentina was the only country which increased its exports, Russia, Roumania, the United States, and Canada all furnishing diminished quantities compared with 1907.

Fruit and Vegetables.—The imports of fruit and vegetables call for little remark. Potatoes were received in decidedly smaller quantities than in the previous year. France sent 2,120,000 cwt. as compared with 3,147,000 cwt. in 1908, while the Channel Islands supplied rather more (1,462,000 cwt. as against 1,207,000 cwt.). The imports from Germany were insignificant. The receipts of tomatoes showed little variation, but there was a falling off in the imports of onions.

The supply of imported hops fell off and only amounted to 140,800 cwt., as against 279,900 cwt. in 1908. About one-half came from the United States.

Wool.—As regards wool the importation was larger than in any previous year, being 803,433,000 lb. as against 719,045,000 lb. in 1908. The bulk of the supply came, as usual, from our own Colonies and Possessions, viz., Australia (312,710,000 lb.), New Zealand (176,457,000 lb.), South Africa (115,901,000 lb.), and India (56,225,000 lb.). The average value was maintained at $9\frac{1}{2}d.$ per lb. as against $9\frac{1}{4}d.$ in 1908, and $10\frac{1}{4}d.$ in the two previous years.

The re-exports of foreign wool were also the largest yet recorded, amounting to 390,107,000 lb. as against 325,451,000 lb. in 1908, so that the balance of foreign wool remaining for manufacture in this country, viz., 413,326,000 lb., though greater than in 1908 (393,594,000 lb.) was less than in the previous year (446,564,000 lb.).

Some indication of the range of prices may be gathered from the average declared value of the different articles, but only to an approximate extent, as an increased importation of a cheaper quality of any article depresses the average value, although no real change in price may have taken place. An example of this occurs in the case of beef, where the drop in the average value of 3s. per cwt. is due to the importation of a larger quantity of comparatively low-priced beef from Argentina and a smaller quantity of higher-priced beef from the United States. With this reservation it may be said that cattle, pork, bacon, hams, eggs, wheat, flour, oats, and wool all show a rise. The figures for some of the principal articles are as follows :—

Description.	1906.	1907.	1908.	1909.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Cattle Head	17 6 10	17 3 5	17 1 11	17 6 5
Sheep "	1 10 4	1 11 11	1 11 1	1 11 10
Beef, fresh Cwt.	1 15 5	1 16 3	1 16 7	1 13 6
Mutton, fresh "	1 17 5	1 17 11	1 17 1	1 12 11
Pork, fresh "	2 5 11	2 7 2	2 6 6	2 7 10
Bacon "	2 12 6	2 15 4	2 10 11	2 19 8
Hams "	2 13 7	2 17 3	2 10 4	2 15 2
Butter "	5 8 2	5 6 6	5 14 4	5 10 4
Cheese "	2 17 8	2 18 3	2 18 0	2 17 2
Eggs Great hundred	0 7 6½	0 7 8½	7 10½	8 2
Wool lb.	0 0 10½	0 0 10½	7 9½	9½
Wheat Cwt.	0 7 0	0 7 8	8 4½	9 3
„ flour "	0 9 7	0 10 1	10 11	11 6½
Barley "	0 5 8	0 6 8	6 9½	6 7½
Oats "	0 5 11	0 6 5	5 10	6 1½
Maize "	0 4 11	0 5 6	6 1½	6 2

The Report of the Assistant Secretary (Mr. T. H. Middleton) on the Proceedings of the Board of Agriculture and Fisheries (under the Destructive Insects and Pests Acts) during the year 1908 has recently been issued (Cd. 4,934, price 3d.).

One of the early steps taken under this Act was the passing of an Order designed to some extent to protect the country against the introduction of new pests by requiring the occupier of any premises on which certain pests are discovered to report the fact to the Board. The pests selected include five insects and four fungi, which are among the most serious enemies of plants abroad. Of these, the Vine Louse or *Phylloxera*, the San José Scale, the Mediterranean Fruit Fly, the Colorado Beetle, Black Knot, and White Root Rot are not known to exist in this country, though some of them do occur occasionally. On the other hand, the Large Larch Sawfly, Black Scab of Potatoes, and American Gooseberry Mildew are, unfortunately, prevalent. Each of these pests is dealt with in the Report, and the action taken in regard to them is described.

As regards Wart Disease, after detailing its life-history and referring to its prevalence in the country, Mr. Middleton observes that the disease has as yet received so little study that it is not possible to say much about the best means for eradicating it or preventing its spread. Cases of the disease have been found in Ireland, and there the Government required the destruction of all the potatoes and prohibited the planting of potatoes on the infected spot for a number of years. It is to be hoped that the remedy will be successful, but it is clearly one which could not possibly be applied in Great Britain owing to the number of infected gardens and the difficulty not only of detecting disease, except at harvest time, but of enforcing the prohibition for a period long enough to ensure the disappearance of the infection. The remedy must to a certain extent depend on the grower, and he can always ensure the desired result by planting some other crop. But owing to the want of accurate knowledge of the life-history of the fungus, it is clear that carefully conducted experiments must be carried out on a proper scientific plan before the cultivator can be offered the sound and practical advice he so badly needs. A number of observations by growers

have been made, and these afford a base for subsequent experiment. The observations resolve themselves into two classes: (1) on the fungicides used as remedies for disease either as curatives or preventives, and (2) on the varieties of potatoes most liable and least liable to attack.

The remedies tried were (1) flowers of sulphur, (2) soot, and (3) lime, all of which were reported to have met with some success in 1908.* Both in pot and garden experiments sulphur has been found to keep the disease in check, even if it has not prevented it. The best and most economical way to use sulphur is first to dust the sets, preferably when stored in the autumn, and then to sprinkle them freely with flowers of sulphur as they lie in the drills before covering up. Before the plants are earthed up the soil should be dusted with sulphur, to prevent the disease from attacking the haulms, at the ground surface. Soot has been sprinkled on the sets as they lay in the drills with some success, and two cases are known where freshly slaked lime sprinkled as described above has checked the disease. Gas lime, on the other hand, laid on in the winter is said to have been ineffectual. Kainit, quicklime, and salt, applied to the ground in the winter, have not proved of any value, and trenching the ground to the depth of $2\frac{1}{2}$ to 3 ft. has also proved of no avail. Evidence as to the susceptibility of the different varieties of potatoes is more definite. The variety named Snowdrop is usually, possibly always, immune. Maincrop, Langworthy, Conquest, and Golden Wonder are not attacked. All varieties belonging to the Up-to-date class take the disease very readily and very badly. With the object of arriving at some trustworthy information the Board arranged for two classes of experiments to be carried out during 1909. Experimental plots were secured in Lancashire, Cheshire, Shropshire, and Breconshire, and planted with seventeen selected varieties of potatoes; while another class of experiment has been arranged to test the effects of possible remedies. Further, in order to test the use of sulphur, a number of cottagers and allotment holders have been supplied with a few pounds of sulphur for the treatment of their gardens.

* In the field experiments of 1909 none of these remedies were effective. For a summary of the results of the experiments, see *Journal* December, 1909, p. 762.

The next subject touched upon is the American Gooseberry Mildew, and it appears that the number of gardens scheduled as infected with this disease increased from 692 in 1907-8 to 2,442 up to the 15th April, 1909. The disease, however, did not spread very widely beyond the areas attacked in the previous year, except in one district, viz., Kent, where it assumed considerable proportions. The counties infected were Gloucester, Worcester, Hereford, Warwick, Shropshire, Leicester, Derby, Northampton, Norfolk, Isle of Ely, Holland Division of Lincoln, Cambridge, Huntingdon, Kent, Essex, Surrey, Sussex, and Middlesex.

After dealing with the problems connected with administration, Mr. Middleton goes on to discuss the economics of the disease under the headings soil and situation, effect of manuring, susceptibility of different varieties, sources of infection and remedies, and it is pointed out that the experience hitherto gained in combating American Gooseberry Mildew may be summed up in the following suggestions and hints for gooseberry growers:—

(1) When American Gooseberry Mildew appears in a garden it must not be assumed that the plantation is ruined.

(2) Neither must it be assumed that mildew is not dangerous and may remain untreated.

(3) The disease should be dealt with at once as recommended in the Board's leaflet. (The leaflet will be sent post free to all applicants.)

(4) The local Inspector or the Board's Inspector should be consulted as to the best way of dealing with severe outbreaks.

(5) Spraying with liver of sulphur in June and July will check the spread of the mildew and will help to secure healthy shoots for next season.

(6) When young wood has been formed, it should be protected by spraying with Bordeaux mixture. Bordeaux may be used instead of liver of sulphur as soon as the berries have been picked. It is to be preferred to liver of sulphur for use in August and September.

(7) Diseased tips should be removed as soon as active growth has ceased. The earlier they are removed the better, provided that the season is sufficiently advanced to ensure that the buds on the shortened shoots do not begin to grow.

(8) The bushes should be carefully pruned during the winter months; plants that have become too dense should be thinned and the last traces of disease removed.

Among other pests dealt with in the Report are the Felted Beech Coccus, the Pigmy Mangold Beetle, a new Tomato Disease, and various "Scabs" of potatoes. The Report also refers to the inquiries into Bee Disease in the Isle of Wight, and into the Food of Birds.

A system for reporting the occurrence of plant diseases, and for disseminating information as to their prevention, was established in Germany in 1905 under the control of the Im-

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Diseases in Germany.**

perial Biological Institute, and it appears from the Report of the Institute for 1908 that there are now twenty-seven principal stations in Germany for the collection of information, of which fourteen are in Prussia. Some four or five States, however, have not as yet entered into the organisation.

The stations are, as a rule, agricultural experiment stations and colleges, and some of them have a considerable number of subsidiary centres. Brandenburg, for instance, is stated to have fourteen local stations with 734 correspondents. In spite of the fact that nearly the whole of the country is thus served, the number of reports to the Biological Institute remains small, and this is attributed to the fact that the system is as yet little known.

During the year the Institute received communications relating to 992 cases of attacks, of which as many as 388 occurred in Brandenburg.

Among the diseases to which reference is made is wart disease (*Chrysophlyctis endobiotica*), which was observed for the first time in Germany in 1908 (*Journal*, December, 1908, p. 704), and American gooseberry mildew, which is stated to be more or less prevalent in districts east of the Elbe, whilst to the west and in the south it has, up to the present, only occurred sporadically (*Journal*, January, 1909, p. 777). Other diseases include *Ophiobolus herpotrichus*, a root disease of wheat (*Journal*, September, 1907, p. 355), potato leaf curl

(*Journal*, September, 1908, p. 457), bacterial disease of potatoes, heart-rot of sugar beet, *Pseudomonas campestris*, mildew of the oak, and a disease resembling pear blight, which had not previously been observed.

A machine for picking hops has recently been patented in America by Mr. E. C. Horst, and is now in use on the extensive hop plantations on the Pacific Coast owned by the E. Clemens Horst Company. The hop farms of this company are stated to cover 8,000 acres, and during picking time the number of hands employed approaches 10,000. The difficulty of obtaining the necessary amount of labour just when required has made the employment of machinery practically a necessity, but until the present machine was introduced none of the various inventions which have been proposed from time to time had proved of any practical value.

According to a statement by the inventor, one of these machines can do the work of 450 hand-pickers. With two men it will pick 100 lb. of green hops per minute, or 6,000 lb. per hour, and picks them absolutely clean and much better than can be done by hand labour. Mr. Horst goes on to describe the advantages of the machine as follows:—"The worry on account of scarcity of labour is eliminated, and the consumer is assured of receiving hops vastly superior in quality over hand-picked hops, for the reason that the grower can pick his hops in any part of the field as they may become ripe and just right for picking. With hand-pickers he is compelled to pick his fields straight through as they are. The result is that some of the hops are unripe, while others are ripe and over-ripe, and as they are all mixed in together and dried on the same drying-floor, you can readily understand why hand-picked hops are not of uniform quality.

"Another serious objection to hand-picking is the great damage that results to hand-picked hops from lying in boxes or sacks from six to twelve hours until the drying begins.

"Pickers usually begin work at five o'clock in the morning,

and the hops they pick are not put on the drying-floors until noon, and sometimes as late as six o'clock. Those picked in the afternoon often do not reach the drying-floors until the next morning. While the hops are packed in sacks or boxes in the meantime, the 75 per cent. of water in the undried hops causes them to sweat, discolour, and damage to such an extent that sulphur is freely used to hide the damage. With the machines this objection is done away with, for the picked hops, instead of being delayed, are landed on the drying-floors two or three minutes from the time the vines are fed into the picking machine.

"The machine is about 50 ft. long, 15 ft. high, and 10 ft. wide. The vines are hauled from the fields and fed in at one end of the machine, and travel over revolving picking-drums the length of the machine, and then return over a second set of the similar drums, at the end of which the vines are discharged free of hops. The drums are equipped with "V"-shaped fingers, which pick the hops as the vines travel over the drums. These fingers are so made and adjusted that they pick the hops directly at the end of the hop and without the stem that is usually left on by hand-picking. The finger construction and adjustment is also made so that most of the leaves are left on the vines, but to guarantee clean picking all the hops go through two separating processes. The upward travelling belt running the full length of the machine receives the hops and leaves from the machine. The hops, being round, roll down into the conveyer that carries them to the second separating process, while the leaves, being light and flat, stick to the belt and are delivered into another conveyer. This part of the mechanism is particularly interesting.

"The second process is by carrying the hops from the conveyer into which they roll from the belt to and through a perforated cylinder through which the hops drop. Leaves that have not been taken out by the previous process are here automatically picked out."

The machine is not, it is understood, on the market for sale at present, and in view of its cost it will probably only be of use to hop-growers on a very large scale in countries where the cost of labour is extremely high.

In the spring when the hop plant begins to throw up shoots, it is customary in this country to thin out and throw away the shoots, leaving only two or three to each plant. In some Continental countries, however, these hop shoots are used as a vegetable, being gathered when from four to five inches long, and boiled and eaten like asparagus.

Hop Shoots as a Vegetable.

They are most largely employed in this way in Belgium, where, according to information furnished by the Ministry of Agriculture, the shoots are gathered from about 2,500 acres of hops. The average production is about 70 lb. per acre. They are sold fresh, and are also supplied to preserving factories. They are among the earliest spring vegetables, and appear on the bill of fare of all the large restaurants in Belgium from the beginning of March.

The encouragement by the State of the breeding of live stock in Switzerland dates from 1893, when a law for the purpose was passed and an annual sum first voted. The efforts of the Government are chiefly directed towards supplementing the work of the Cantons, and the following is a summary of the measures taken :—

Improvement of Live Stock in Switzerland.

Horse Breeding.—The Government undertake to purchase suitable stallions on behalf of the Cantons and pays one-half of the purchase-money. The Cantons lease these stallions to breeders and are required to supervise their use under proper conditions for breeding purposes during at least six years. After six years the Government may re-purchase an animal or declare it unfit for breeding purposes, either with or without compensation, or may grant the breeder an annual subsidy of five per cent. upon its estimated value. In addition, stallions are lent to Cantons for short periods from the State stud.

In the case of brood mares and fillies premiums are awarded to animals chosen annually by judges appointed for the purpose by the Government. The premiums amount to £2 8s. for fillies from two to three years old, and £8 16s. for mares from three to five years old, the former being paid

a year after award on production of evidence that the animals have been retained in the country for breeding purposes; and the latter after the birth of a foal by an approved sire. The same animal may receive a premium once as a filly and once as a mare, but not more.

Subsidies are granted to horse shows and competitions for the purpose of providing prizes for horses bred from the stallions imported with the aid of the Government or recognised as suitable for breeding purposes. Subsidies not exceeding £2 per head are also awarded for grass land on which foals from approved stallions are pastured.

Cattle Breeding.—The encouragement of cattle breeding is effected by means of premiums for bulls, cows, and small herds, and by small grants to promote the formation of breeding and herdbook societies. The premiums supplement and are equal in amount to the premiums awarded by the Canton; they are awarded on the result of the judging at a number of local competitions held for the purpose, the judges being a permanent body who travel from one place to another. These competitions or shows are on the simplest scale, lasting for one day only and being confined merely to the judging of the animals exhibited. The premiums granted by the State and the Canton are not to amount together to less than £4 for each bull or cow. They are not actually awarded for nine months after the competition in order that satisfactory evidence may be produced of the use of the animals for breeding purposes. The judging is based on a system of points according to a fixed scale.

Goats and Pigs.—Premiums are given under similar conditions for boars and goats.

In order to encourage breeders to exhibit at foreign live stock shows, grants may be made for defraying the expense of transport and insurance of the animals.

The progress of agriculture in Belgium appears during recent years to have been somewhat striking. In a note attached to the Budget of the Department of Agriculture for 1909 some figures are given which show that there has been a steady increase in the produce of some of the leading crops, while at the same time

**Progress of Agriculture
in Belgium.**

a larger number of live stock are kept. The following table shows the average yields during the last thirty years:—

		Cwt. per acre.					
		1870-80.	1886-95.	1900-04.	1905.	1906.	1907.
Wheat...	...	12'1	14'7	18'4	16'5	18'7	21'6
Rye ...	...	11'3	13'5	17'0	16'1	16'4	18'2
Oats ...	...	12'8	14'2	18'7	16'4	20'0	21'3
Mangolds	...	256'7	324'2	423'6	481'3	442'5	418'8
Potatoes	...	97'2	88'7	134'1	84'6	132'3	132'0

Allowing for the fact that some improvement may have been effected in the collection of the returns since the earlier years given, this table seems to indicate that the average production is materially greater now than it was some thirty years ago.

In the same way cattle and pigs have increased in numbers.

		1880.	1895.	1907.
Horses (agricultural)	...	—	216,199	249,831
Cattle	...	1,382,815	1,420,978	1,812,689
Pigs..	...	646,375	1,163,133	1,279,462

The rapid growth of co-operation, also, even within the last twelve years, is shown by comparing the purchases made through the co-operative associations and the sales of co-operative dairies in 1895 with those in 1907.

		1895.	1907.
		£	£
Purchases of seeds, machines, and manures	...	205,110	944,066
Sales by co-operative dairies	...	129,478	1,420,406

A still more interesting point is the very large amount of artificial manures stated to be used per acre. The figures, it may be noted, are obtained by averaging the returns made by each holder, who is asked to state the quantities of manures which he has used during the year.

		Lb. per acre.				
		1895.	1904.	1905.	1906.	1907.
Basic slag ...	...	19'6	45'5	47'3	49'1	51'8
Superphosphate of lime	...	25'0	56'2	62'5	60'7	59'8
Kainit ...	...	1'8	11'6	14'3	15'2	15'2
Nitrate of soda	...	25'0	40'2	41'9	40'2	40'2

In this connection it may be mentioned that Consul-General Sir Cecil Hartslet, in reporting on the agriculture of Belgium in 1908-9 (*F.O. Reports, Annual Series, No. 4351*), states that iron harrows are being introduced largely on a number of farms in the Walloon districts. In the Ardennes and Mons neighbourhood hay-cutting, reaping, and binding machines are rapidly increasing in use.

A great deal of this agricultural machinery is imported

from the United Kingdom, as well as from America. Thrashing machines, traction engines, &c., are also imported from Great Britain. There should be a very fair opening for further supplies of these classes of implements.

Since 1899 efforts have been made in Denmark to facilitate the acquisition of allotments and small holdings by agricultural labourers, loans on favourable terms being made by the State to purchasers. The law of 1904, which had itself revised the earlier enactment of 1899, has recently been re-enacted in an amended form.

Small Holdings in Denmark.

One of the features of the new law is that its operations extend to all men (and unmarried women gaining their livelihood chiefly by agricultural work), rural artisans, and fishermen, and all persons partly engaged in agricultural work. The value of the land to be acquired is raised from 5,000 kroner (£278) to a maximum of 6,500 kroner (£361), or in districts where land is exceptionally expensive, to 8,000 kroner (£444), and the State may advance a sum not exceeding nine-tenths of the total value. When the money is advanced, interest must be paid on it at the rate of 3 per cent., but repayment does not begin for five years. At the end of five years the repayment of capital begins, and is fixed at 4 per cent. (including interest) on two-fifths of the amount of the loan until this portion is paid off. When this has been done, the balance of the loan is to be repaid at the rate of 5 per cent. per annum for interest and principal.

SUMMARY OF AGRICULTURAL EXPERIMENTS.*

WEEDS AND FUNGUS DISEASES.

Spraying of Charlock and Spurrey (Univ. Coll. of North Wales, Bangor, Bull. ii., 1908).—Spraying was conducted in 1908 on fifteen farms, solutions of 15, 20, and 25 lb. of sulphate of copper in 50 gallons of water being used. In a number of cases rain fell within a few

* The summaries of Agricultural Experiments which have appeared in the present volume have been as follows:—Experiments with Cereals, April, p. 65, and May, p. 150; Experiments with Root Crops, June, p. 239, and July, p. 311; Experiments with Potatoes, July, p. 313, and August, p. 402; Miscellaneous Experiments, August, p. 405, and September, p. 489; Experiments with Clover and Grass, October, p. 589; Experiments with Live Stock, November, p. 660; and Experiments with Milk, Butter, and Cheese, December, p. 733.

hours after spraying. Professor Winter remarks that the 3 per cent. solution, at the rate of 50 gallons per acre, which appears to be sufficient in dry climates, was, as usual, only moderately successful, and in a climate like that of North Wales, the application of a 4 or 5 per cent. solution, preferably the latter, is necessary. At several centres there was a considerable amount of spurrey on the sprayed plots. The results show that a 5 per cent. solution of copper sulphate can be relied on to kill spurrey, while weaker solutions are comparatively ineffective.

Destruction of Moss (Cornwall C.C., Notes on Agric. and Poultry Expts., 1905 and 1906).—From 1903 to 1906 old mossy pastures were treated with 6 cwt. per acre of new superphosphate (28 to 30 per cent.) phosphates applied in February in two consecutive seasons. In pastures slightly affected with moss, a single application has been found sufficient, and on very poor neglected pastures with a dense carpet of moss, sometimes an inch deep, the second application invariably eradicated the moss. The superphosphate was followed by equal weights of bone meal applied in the autumn, and in this way comparatively worthless sheepwalks were rendered remunerative.

Effect of Weeding and Hoeing on Roots (Univ. Coll., Reading, Results of Expts., 1908)—The following results have been obtained with mangolds by hoeing and weeding.—

	Tons per acre	
	1907	1908
No weeding after setting out the plants	15½	16½
Hoeed once only	33½	33½
Hoeed twice only	37½	36½
Kept clean by hoeing	39½	38
Kept clean by hand weeding only, no hoeing being done after setting out the plants	40	38½

The results in 1908 confirmed those of previous years. It will be seen that one hoeing added about 16 tons to the crop, as compared with the rows in which no weeding was done, and a second hoeing added about 4 tons per acre. Further hoeing, so as to keep down the weeds completely, gave only a small increase of a little over a ton. A comparison of the plot kept clean by hand-weeding only appears to lead to the conclusion that the benefit of hoeing is due to the killing of the weeds rather than to improvement in the texture of the soil.

Destruction of Thistles (Field Expts. at Harper-Adams Agric. Coll., Rept., 1908).—These trials were carried out in 1907 and 1908 on old grass land which for years had carried a large crop of thistles. The weeds were treated in various ways:—(1) Cut three times in the season (on June 10th, July 9th, July 17th) and dressed with 4 cwt common salt after each cutting; (2) cut three times, but not salted; (3) cut once in the season with and without application of salt; (4) not cut, but headed with a stick to prevent seeding, and salted; (5) headed only, without salt; (6) cut and sprayed with sulphate of copper; and (7) headed and sprayed. The early cutting was found to be very beneficial, reducing the number of plants and weakening the remaining ones so as almost to clear the plots. A single cutting was also beneficial. Salting after cutting and spraying with copper sulphate had little effect.

Finger-and-Toe (Northumberland C.C., *Guide to Expts. at Cockle Park for 1909*).—The swede crop of 1903 was practically destroyed by finger-and-toe in a field at Cockle Park.

In February, 1904, various dressings were applied on twenty drills, and swedes were grown continuously thereafter. The following shows the percentages of sound roots on the plots in each year from 1904 to 1908, and indicates how slowly lime acts in checking the disease, no doubt owing to the time it takes to get thoroughly mixed with the soil:—

Plot.	Dressings and cost, 1904, only	Percentage of Sound Roots.				
		1904.	1905.	1906	1907.	1908.
1	2½ tons lime 31/3	0	1	10	48	15.1
2	5 tons lime 62/6	0	4	7	52	14.6
3	10 tons lime 125/-	0	0	7	61	68.5
4	4 tons gas lime 10/-	0	0	0	29	6.4
5	10 tons "lime mud" 25/-	0	1	7	64	51.3
6	No dressing	0	0	0	0	3.1
7	5 cwt. sulphide of lime ? .. (2 tons ground lime, 1907)	0	1	0	5	7.1
8	8 tons flue dust ?	0	0	5	0	9.4
9	2 cwt. sulphate of zinc ? (3 tons ground limestone, 1907).	0	0	0	0	9.2

The percentage of sound roots was quite small until 1907, even on the best plots, but this does not imply that the remainder were worthless, as in many cases a large proportion were only slightly diseased, and these were practically uninjured for feeding purposes.

The lime was slaked to a fine powder, ploughed in four inches deep and the plots deeply harrowed, but its action was slow, and with the exception of gas lime, it was most effective in the fourth and fifth years after application. Although the crop was a total failure in 1903 it has since averaged about 8 tons per acre on the undressed plot, and it is concluded that good cultivation and the keeping of the soil in good tilth are the most effective means of checking the disease.

All the lime dressings were very effective, ten tons per acre giving the best results at first, but in the later years, ten tons lime mud at one-fifth the cost was quite as effective. This latter is a bye-product, containing about 30 per cent. of the equivalent of lime (CaO), chiefly in the form of carbonate, and was obtained from the United Alkali Co. at Gateshead for from 2s. 6d. to 4s. 3d. per ton. Applications of sulphide of lime and sulphate of zinc were tried, but gave no results, and ground limestone and "flue dust" are now being tried in their place.

Finger-and-Toe (Field Expts. at Harper Adams Agric. Coll., Rept. 1908).—Four plots on a field, which had in previous years been badly affected with this disease, were dressed with (1) 2½ tons slaked lime, (2) no lime, (3) 4 cwt. Fingtocide, (4) 1 ton ground lime. There was practically no disease present on Plot 2, and on all the other plots the roots were healthy and sound. There was, however, a slight increase in the yield per acre, the limed Plots producing 22 cwt. more swedes than the "no lime" Plot.

Spraying of Potatoes (Univ. Coll. of North Wales, Bangor, Agric. Dept., Bulls. iii and vi., 1908).—These experiments have been carried

on at a number of centres since 1901. It is considered that these experiments have shown that spraying produces a large increase in the yield of marketable potatoes, by imparting increased vigour to the plant, and apart from its effect on the disease. In 1908 the experiments were arranged to ascertain the effect of spraying twice at intervals, instead of on one occasion only, and to determine the most suitable time if the potatoes are to be sprayed once only. The trials were made on four one-tenth acre plots at five farms, the dressing consisting of 24 lb. sulphate of copper and 30 lb. pure washing soda, in 120 gallons of water per acre. The average weights of marketable potatoes obtained at the five centres were as follows:—Plot I., unsprayed, 8 tons; Plot II., sprayed once (early), 9 tons 8½ cwt.; Plot III., sprayed twice, 10 tons 1 cwt.; Plot IV., sprayed once (late), 8 tons 19 cwt. Thus the plot which was sprayed twice produced over 12 cwt. more than the plot sprayed once (early) and 22 cwt. more than the plot sprayed once (late), and Prof. Winter considers that there can be little doubt that, where possible, potatoes should be sprayed twice. Where they are sprayed only once, a late spraying appears less satisfactory than an early one.

Experiments were again carried out to ascertain whether spraying could be shown to have an effect on the vigour of the plant where potatoes were grown from new seed, and had thus obtained the increased vigour that change of seed gives. In both years the advantages of spraying both old and new seed were marked, but the best results were obtained from the new seed, and Prof. Winter concludes that a change of seed does not render spraying unnecessary, and if the best financial results are to be obtained, both should be employed.

Spraying of Potatoes (Edinburgh and E. of Scotland Coll. of Agric., Bull. xvii.). In 1907 and 1908 experiments were carried out at seven centres in the Eastern counties of Scotland to test the effect of spraying as a preventive of potato disease, and its general effect on the crop. Two sprays were used, *viz.*, a lime spray composed of 12 lb. sulphate of copper, and 6 lb. unslaked lime in 80 gallons water; and a soda spray composed of 12 lb. sulphate of copper and 14 lb. pure washing soda in 80 gallons water. These quantities per acre were applied about the middle of July. In two cases a second application was made about three weeks later. In 1907 the two centres sprayed gave results favourable to spraying, but in 1908, only one centre out of five gave a favourable result. This result may have been due to the dryer climatic conditions in 1908 in East Lothian, one of the driest counties in Scotland; and no conclusions as to the efficacy of spraying are drawn at present. Where a favourable result was obtained, the soda spray did better than the lime spray.

Finger-and-Toe (Cornwall C.C., Notes on Agric. and Poultry Expts. in 1905 and 1906).—For several years experiments were conducted with lime and other substances, the results showing that while heavy applications of lime were beneficial, the treatment was expensive. In addition, where these heavy dressings (6 tons per acre) had been used mangolds and oats could not be grown successfully for some time. This suggested that oats and mangolds, which appeared, like finger-and-toe, to be favoured by acidity of the soil, would, if grown continuously, so reduce the acidity as to free the land from finger-and-toe. To test this point a field on which previous to 1902 the turnip crop was

entirely destroyed by the disease was cropped with oats in 1902, mangolds in 1903, and oats in 1904 and 1905. In 1906 a number of varieties of swedes, not claimed to be disease-resisting, were drilled with 10 cwt. of basic slag per acre, and all produced a sound healthy crop. A few yards of land in the gateway, that had not been properly cropped and cultivated still produced a badly diseased crop. It is, however, to be noted that previous to 1902, experiments had been conducted on a portion of this field with various substances, more especially lime, and it is conceivable that the action of these substances is traceable in the results obtained in 1906.

It was noticed that about 20 per cent. of the charlock in the swede crop was affected by finger and toe, while the swedes were comparatively free. The charlock appeared, therefore, to be more susceptible, and it is clearly of importance to keep such land free from it, in order to prevent it from perpetuating the disease.

Finger-and-Toe (Worcestershire C.C., Rept. on the County Exptl. Garden, Droitwich, 1908).—Land on which a crop of Brussels sprouts was destroyed in 1902, was dressed with 13 tons per acre of quick-lime in 1903, $6\frac{1}{2}$ tons in 1904, and $3\frac{1}{2}$ tons in 1905 and subsequent years. On one plot the lime was dug in, and on another left on the surface. By 1907 the former plot had 66·7 per cent. of plants free from disease, and the latter 77·8 per cent., the other plants being only slightly affected. Gas lime was applied in the same quantities to another plot, but effected only a slight improvement, about 3 per cent. of the plants being entirely free from disease. Apterite and Vaporite were also tried, but apparently without effect.

Dry-Rot of Potatoes.—An investigation reported in *The Journal of the Linnean Society*, vol. 39, No. 270, has been conducted at University College, Reading, by Miss Sibyl Longman, into the dry rot of potatoes caused by the fungus *Fusarium solani*. The object of the research was of a three-fold character: (1) To determine whether the fungus is capable of inducing the disease in the growing potato plant, as well as of setting up the well-known pathological condition in the stored tuber; (2) to ascertain whether dry-rot can be induced in potato-tubers directly by inoculation with spores of *Fusarium solani*, or whether, as is commonly supposed, dry-rot only follows upon wet-rot; and (3) to determine experimentally whether tubers infected by *F. solani* can be sterilized by heat, i.e., whether the death temperature of the fungus is higher or lower than that of the tuber.

The results of the investigation serve to confirm the conclusions already reached by Smith and Swingle in 1904. It was found that *F. solani* is a true parasite capable of destroying both the resting tuber and also the aerial shoots of the growing plant; that there is no necessary time-relation between an outbreak of dry-rot and one of wet-rot, but that the disease may be induced by inoculating healthy tubers with pure cultures of the spores of the fungus; and that sterilisation by heat is not possible, the death-temperature of the fungus being higher than that of the potato.

Clover Sickness.—(*Midland Agric. Coll. Bull.* 5, 1908-9).—Field experiments were carried out with four kinds of clover at three centres, a number of artificial dressings being applied to test their effect in preserving the plant. The results obtained appear inconclusive.

MISCELLANEOUS NOTES.

Agricultural Show at Lagos.—An Agricultural Show is to be held at Lagos, the capital of Southern Nigeria, during the first week of December, 1910. It is hoped that a leading feature of the show will be a section for implements and machinery suitable for the cultivation of tropical produce, and for its preparation for export and for local consumption.

**Agricultural Shows
and Exhibitions
Abroad.**

Inquiries regarding the show may be addressed, until the end of February, to Mr. R. E. Dennett, Provincial Forestry Officer for Southern Nigeria, care of the Crown Agents for the Colonies, Whitehall Gardens, London, S.W., and after that time to the Commercial Intelligence Officer, Lagos.

Agricultural Exhibition at Hamburg.—H.M. Consul-General at Hamburg (Sir W. Ward, C.V.O.) reports that the twenty-fourth show of the German Agricultural Society, to be held at Hamburg from June 2nd to 7th, 1910, will be open, to a limited extent, to non-German exhibitors. The central office of the German Agricultural Society at Berlin states that, under Part I. of the Exhibition ("Animals"), only animals which are owned and have been bred by agriculturists in Germany will be allowed to be exhibited; under Part II. ("Agricultural Products"), objects of foreign origin may be exhibited by foreigners, provided that the latter have business representatives resident in Germany; under Part III. ("Agricultural Implements and Machinery and Buildings"), objects of non-German origin may be exhibited without the restriction mentioned under Part II. (*Board of Trade Journal*, November 11th, 1909.)

Agricultural Exhibition in India.—The Commercial Intelligence Branch of the Board of Trade are informed that an exhibition, to be known as the United Provinces Agricultural and Industrial Exhibition, is to be opened at Allahabad in December, 1910, and will last for about three months.

This exhibition, it is stated, will equal in general extent any exhibition hitherto held in Calcutta or Bombay, and the Deputy Director of Agriculture, United Provinces, is already arranging for exhibits from England for the agricultural section.

Copies of the preliminary prospectus of the exhibition, and of a pamphlet on "Northern India as a Market for Agricultural Machinery," by the Director of Land Records and Agriculture, and the Deputy Director of Agriculture, United Provinces, may be seen by British firms interested on application at the Commercial Intelligence Branch of the Board of Trade, 73 Basinghall Street, London, E.C. (*Board of Trade Journal*, December 9th, 1909.)

Horticultural and Agricultural Exhibition at Hyères.—An International Exhibition will be held at Hyères from March 19th to April 20th, 1910, and will comprise nine sections, including horticulture, fruit-growing, agricultural produce, vine-growing, forestry, live stock, poultry, bees, and machinery and implements of all kinds. Exhibits will be admitted free of duty, and packages will be returned free on the French railways. A copy of the programme can be seen at the office of the Board.

The Soy Bean Trade of China.—In continuation of the information as to this trade given in the Journal, December, 1909, p. 735, the following notes from the Report on the

Notes on Foreign Trade of China (*Foreign Office Agriculture Abroad. Reports, Annual Series, No. 4386*), will be of interest.

Although Japan is the destination of most of the beans and bean cake exported from China, one of the most interesting features of the trade of China in 1908 was the commencement of the export on a large scale of the "soya" beans of Manchuria direct to Europe. The port of Dalny, or Dairen as it is now called, is the chief seat of the export for Europe. It is estimated that during the season which began in November, 1908, and closed in June, 1909, over 152,000 tons of beans were shipped from Dairen to Europe, declared mostly for Liverpool, Hull and Bremen. The number of vessels employed for this purpose was 25. During the same period the export of beans from Vladivostok is stated to have been over 143,000 tons, of which 65,000 tons were shipped in June. More than half the quantity shipped from Vladivostok went to the United Kingdom.

Excellent crops in Manchuria, low prices in gold for the produce and cheap freights made a combination of circumstances favourable for the trade, such as cannot reasonably be expected to occur frequently. The purchase of beans in the interior is stated to be an operation involving no small difficulty and financial risk. However, the prospects for next season's bean trade are, on the whole, bright. Hankow also is the outlet of a great bean-producing district, but in its competition for direct export to Europe it is handicapped by much heavier freight, £1 15s. per ton against 19s. per ton (rising afterwards to £1 6s) from Dairen. Moreover, some experimental shipments of Yangtse beans made in the autumn of 1908 turned out unsuccessful, the beans from the damper climate of Central China, although looking just as good as the Manchuria beans when shipped, becoming mouldy on the voyage. An increase in the export of beans is noted also at Chinkiang.

Bean cake is exported chiefly from Newchwang. The export there increased from some 4,300,000 cwt. in 1907, to some 5,400,000 cwt. in 1908, and in spite of an increasing export from Dairen, Japan took 78 per cent of this amount, the same as in the two previous years.

Chilian Nitrate Combination.—Mr. Consul Hudson, in his Report on the trade of Chili (*F. O. Reports, Annual Series, No. 4388*), states that the Nitrate Combination was dissolved on March 31st, 1909 (the date on which the working agreement expired), owing to dissatisfaction on the part of certain of the component companies more favourably situated, and producing at a lower cost, at having to submit to their output being considerably restricted so as to allow of the competition of undertakings whose location or constitutional defects render it impossible for them to work profitably under similar conditions; the effect of the dissolution of the Combine is already apparent in the present increased output of nitrate. Efforts continue to be made by those interested for the renewal of the combination on a more satisfactory basis, which if successful may result in improving prices, thereby improving local trade conditions. But a still more satisfactory solution of the present difficulty would be the discovery of a cheaper method of production, as

many of the *oficinas* (nitrate works) find it impossible to produce profitably at the present low prices obtained for nitrate.

During the year 1908 the average price of nitrate for 95 per cent. f.o.b. was 7s. 6½d. per quintal of 110 lb., and the total export from Iquique was 12,879,201 quintals as compared with 11,382,649 quintals exported in 1907 at an average price of 8s. 7½d. per quintal.

The *first* week of December was marked by very rough and unsettled weather, rain falling daily over a large part of the kingdom, and towards the end of the week some hail and snow.

Notes on the Weather in December.

Warmth was "unusual" in England E. and the midlands, but was "deficient" in Scotland W. Rainfall was "heavy" or "very heavy" everywhere, and sunshine, as a rule, "scanty."

The weather continued with little change during the *second* week; warmth was "deficient" throughout the kingdom, except in England E. and the Midlands, while rainfall, except in Ireland, was "heavy." Sunshine was "abundant" in England E. and S.E. ("very abundant" in Scotland E.).

During the early days of the *third* week, the conditions were dry and quiet, but rainfall exceeded the normal in England E., S.E., and the Midlands. In the two first-named districts, it was "heavy." Sunshine was "scanty" (England E. "very scanty") in the Eastern section of the kingdom, except in Scotland E.

Unsettled conditions prevailed again in the *fourth* week, and heavy falls of rain fell in the south, and severe snowstorms occurred further north. The record was "heavy" in England S.E. and S.W., and "very heavy" in other parts of the kingdom. Sunshine, however, was "very abundant" everywhere except in Scotland W., where it was "abundant."

Notes on Crop Prospects Abroad.

Argentina.—According to *Dornbusch* (14th and 31st December) the estimate of the Department of Agriculture of the area and production of crops this year is as follows.—

	Acres 1908-9	Acres. 1909-10	Tons 1909-10.
Wheat .. .	16,327,091	14,416,279	4,279,000
Linseed	3,789,721	3,595,332	895,000
Oats . . .	1,564,251	1,414,322	633,000

Mr. Townley, the British Minister at Buenos Aires, writing on November 30th, states that wheat harvesting had already begun in the North, and with fine weather would proceed rapidly. Some damage had been done by locusts to the crops in the Provinces of Santa Fé and Entre Rios, but in the Province of Buenos Aires the prospects are extremely good. The maize crop has been less adversely affected than the other crops by the heavy rains which occurred in November, and it is estimated that the total area sown exceeds that of last year, and a much larger crop may be expected.

Russian Harvest of 1909.—Mr. A. W. Woodhouse, British Consul of St. Petersburg, has forwarded the following final figures published by the Central Statistical Committee of the harvest of 1909 in the 73 prov-

inces of Russia, including the Caucasus and Siberia :—Wheat, 419,798,000 cwt. ; rye, 448,613,000 cwt. ; oats, 327,396,000 cwt. ; barley, 203,870,000 cwt. ; maize, 19,963,000 cwt. The yields of all the crops, except spring rye and maize, are considerably above the average for the five years 1903-7.

Russia.—The Board have received through the Foreign Office a summary of the official report on the winter grain sowings in European Russia. Owing to prolonged dry weather, conditions in Russia were extremely unfavourable over a vast expanse of the grain-growing territory, especially in the black earth zone, the chief producing region. On this account, sowing was done abnormally late. During the first half of November, favourable rains improved matters, but without restoring the sowings to a satisfactory condition. In the non-black earth region, the autumnal weather conditions were much more satisfactory, allowing the grain to be sown, as a rule, at the normal time, and the winter sowings everywhere in those regions appear to be very successful. The state of the winter grain sowings in general, at the setting in of winter, is described as "not fully satisfactory."

Canada.—The High Commissioner for Canada reports that a bulletin compiled by the Census and Statistics Office gives the final estimates of crops for 1909, as follows —

	Acres	Bushels
Wheat	7,750,000	166,744,000
Oats	9,303,000	353,466,000
Barley	1,865,000	55,398,000
Potatoes	513,500	99,087,000

The average production of wheat is $21\frac{1}{2}$ bushels, as compared with 17 bushels in 1908; of oats, 38 bushels, as against 31.64 bushels; and of barley, $29\frac{1}{2}$ bushels, against $26\frac{1}{2}$ bushels. Potatoes yielded 193 bushels, as compared with 132 bushels in 1908.

THE Board of Agriculture and Fisheries have been furnished by the Board of Trade with the following report, based on returns from correspondents in various districts, on the demand for agricultural labour in December.

Agricultural Labour in England during December.

Agricultural employment was generally regular in December, but bad weather hindered outdoor work in most parts of the country, and there was consequently some loss of time among day labourers. There was a fairly good demand for such men, accompanied by an even supply, in the Eastern Counties, but elsewhere the demand was generally only moderate, and the supply tended to be somewhat in excess of the demand.

Northorn Counties.—Outdoor work in *Northumberland* was somewhat interfered with by frost and storms. In *Cumberland* the severe weather caused farm work to fall into arrear, particularly as regards root-storing and ploughing. The supply of labour, both for day work and permanent situations, was somewhat in excess of requirements. Some irregularity of employment was reported from *Westmorland*. The supply of and demand for day labourers were about equal in *Lancashire*. In *Yorkshire* threshing, turnip-pulling, manure-carting, hedging, and

ditching provided a fairly large amount of work for day labourers when the weather permitted; frost and rain, however, caused some loss of time to men of this class, and the supply generally tended to be somewhat in excess of the demand.

Midland Counties.—There was a fair demand for day labourers in *Cheshire*, but not in *Derbyshire* and *Nottinghamshire*; in all three counties outdoor work suffered some interruption from severe weather. Threshing, root-lifting, hedging, and ditching provided fairly regular employment for day labourers in *Leicestershire*. Outdoor employment was frequently interrupted by wet and stormy weather in *Staffordshire*. Correspondents in *Shropshire* state that day labourers were in fairly constant employment during December. The demand for day labourers was reported as greater than the supply in the Evesham Union of *Worcestershire*, but elsewhere in this county there was but little demand for their services. Hedging, ditching, spreading manure, threshing, &c., caused a fair demand for day labourers in *Warwickshire*. There was a moderate demand for men of this class in *Northamptonshire*. Certain correspondents state that where corn had been carted in a damp condition threshing had been delayed, and the demand for labour was consequently affected. The supply and demand for day labourers were generally about equal in *Oxfordshire*. A demand for shepherds, carters, and stockmen was reported in the Banbury Union. There was some surplus of casual labour in *Buckinghamshire*, where wet weather hindered employment to a certain extent. Threshing, manure-carting, &c., provided a good deal of work when the weather permitted in *Hertfordshire* and *Bedfordshire*, and employment was fairly regular on the whole.

Eastern Counties.—Bad weather caused some interruption to outdoor work in *Huntingdonshire* and *Cambridgeshire*, but no great irregularity of employment was reported from these counties, the supply of labour generally being equalled by the demand. Similar reports come from *Lincolnshire*, where threshing and work on the root crops provided a good deal of work. Day labourers were generally in fairly regular employment in *Norfolk* and *Suffolk*, where farm work was in arrear. The supply of such labour was equal to the demand in most of the districts reported on. Outdoor work was a good deal interfered with by wet weather in *Essex*, where day labourers were chiefly occupied at threshing, hedging, and ditching, and draining the land. A correspondent in the Braintree Union writes that there are more applicants for permanent situations than two or three years ago.

South and South-Western Counties.—Day labourers in *Kent* generally lost but little time through bad weather; the demand for their services was, however, only moderate on the whole, and some men were irregularly employed in consequence. There was a sufficient supply of day labourers in *Surrey*, and in the Guildford Union a surplus was reported. Agricultural employment was fairly regular in *Sussex*, but the supply of day labourers was somewhat in excess of the demand. Wet weather caused some interruption to outdoor employment in *Hampshire* and *Berkshire*. In these counties the supply of day labourers was generally about equal to the demand. Threshing, storing roots, hedging, &c., provided a good deal of work, when the weather permitted, for day labourers in certain districts in *Wiltshire*, but the supply of

such men was quite sufficient. A correspondent in the Devizes Union states that men for permanent situations are less difficult to obtain than formerly. Employment for day labourers was somewhat slack in *Dorset* and *Somerset*, where a moderate demand for this class of men was met by an adequate supply. Similar reports came from *Herefordshire*. Day labourers were generally in small demand in *Gloucestershire*; there was a plentiful supply of such men, but some scarcity of men for permanent situations was still reported. Threshing, hedging, and other work provided fairly regular employment in *Devonshire* and *Cornwall*, but some time was lost by day labourers in certain districts through bad weather.

THE CORN MARKETS IN DECEMBER.

C. KAINS-JACKSON.

Very mild Christmas weather caused the year to finish with a slow trade, but the total sales of British wheat for the month showed a brisker business as compared with November. The speculation in grain for shipment in 1910 was never very active, but considerable excitement characterised two trades closely connected with Mark Lane. These were the oilseed and the sugar trades, in both of which much difficulty was experienced in obtaining contracts for 1910 delivery at anything like a moderate price. The effect of this rise in oilseeds and sugar during the last weeks of 1909 is likely to have a strengthening influence on the feeding-stuffs regularly sold on the corn exchanges.

Wheat.—Extremely little change occurred in the mean value of British wheat, thus Mark Lane, at the end of November, was averaging 34s. 1d. and quoted 34s. 4d. at Christmastide. Ipswich moved from 33s. 5d. on 23rd November to 33s. 3d. on the 21st December. Other markets showed similarly trivial changes. The mean price for all the markets was a trifle better for December than for November, and the condition of deliveries in the days following Christmas showed a welcome improvement. The total sales for the first four months of the cereal year lead to the supposition that the proportion of wheat fit only for feeding use is even larger than at first imagined. But the figures of an entire and undivided cereal year are alone of much value as a clue to production and use. Thus, in the cereal year ended 31st August, a very striking difference between its two halves was presented, and very erroneous conclusions would have been drawn if at the six months an attempt had been made to forecast the whole supply. The price of British wheat for December was practically what it was for January, but in reality, there was a rise on the year; the samples which were fetching 33s. in January last would in December have fetched 36s., if not more. The farmer, therefore, has thus far escaped the loss usually involved in a falling off in quality and condition. The miller, however, is bound to use an increased proportion of foreign wheat, for its superior dryness and strength in gluten. This augmented inquiry for imported produce has prevented the weekly average of 568,000 qrs. of wheat and flour from abroad during the present cereal year depressing the exchanges. As, however, it is a supply showing 67,000 qrs. mean weekly increase on last season, it has naturally been a barrier to material advance. At the end of December, fine

Manitoba was making 41s. 3d. per qr. and American red winter 8s. 3d. per cential, prices identical with those accepted in the last days of November. The year at Mark Lane ended with 39s. paid for Durum, 44s. 6d. for fine old Australian, 41s. for New Zealand, 41s. for Russian Azima, and 40s. for Russian Ghirka. These were the sorts mostly on offer. At Liverpool, prices closing the month were 8s. 3d. per cential for No. 2 Manitoba, 8s. 5d. for Argentine, 8s. 4d. for white Karáchi, and 8s. 3d. for Red Karáchi. Hull was a little cheaper than Liverpool for Indian wheat, but agreed with London and Liverpool for other sorts. December shipments were 1,253,000 qrs. from North America, 109,000 qrs. from South America, 2,664,000 qrs. from Russia, 173,000 qrs. from "Europe, S.E.," and 187,000 qrs. from India. In December, 1908, shipments were 1,586,000 qrs. from North America, 60,000 qrs. from South America, 747,000 qrs. from Russia, 402,000 qrs. from "Europe, S.E." and 5,000 qrs. from Persia. No Indian shipments took place in 1908 after 7th November. The supply on passage on the last day of the month was 1,900,000 qrs. which was 202,000 qrs. increase from 30th November, and 168,000 qrs. more than on 31st December, 1908, but still considerably below the average of the past ten years. Continental inquiry was much brisker than a year previously. This inquiry was especially vigorous for Russian, of which the supply on passage to the United Kingdom actually fell 20,000 qrs. on the month.

Flour.—The flour trade was dull for the first fortnight of December, and also for the last three days, but just before Christmas, from the 17th to the 22nd, there was a sharp outburst of demand, and in London value improved by sixpence for all the products of the town mills. This advance was not lost, on trade being resumed after Christmas, but the demand did not revive before the year closed. There was, however, nothing depressing in this, as bakers, when buying from the 17th to 22nd, and especially at the excellent market of the 20th, acquired enough flour to carry them into 1910. The old year closed with top price at 35s., town whites at 33s., town households 30s., No. 2 at 28s. 6d. per qr. Fine middlings were £7, sharps £5 10s., and bran £5 per ton. Turning to country flour, we found the year closing with plenty to be had at 26s. per sack, though 32s. was commanded by patents and fancy sorts where the baker pays for the protection of some great firm's name for level grade and skilful mixture. The price of American flour at the close of 1909, was 32s. for best Minneapolis, 31s. for best Kansas, and 28s. for Iron Duke. Canadian made 31s. 6d. for fine quality from the mills on Lake Superior. Hungarian at 49s. on spot, had very little sale, but 47s. for January shipment from Trieste was a more reasonable quotation. A few sales were reported of Australian at 31s. 6d. and of best French at 28s. 6d. per sack. There were 240,000 sacks on passage on the last day of the old year. America, in December 1909, shipped 533,000 sacks, against 706,000 sacks in December, 1908.

Barley.—All through December, Mark Lane was a poor market, and prices were thoroughly unsatisfactory. Hardly any markets averaged thirty shillings, even in the chief counties for the production of malting quality. Kent, on the whole, showed the best prices, the chief markets circling round a twenty-seven shilling average. The sales were increased by the low prices, but it was impossible to get value up in the absence of quality, and the prevalence of discoloured grain.

The price of foreign barley did not vary by more than 3d. for feeding kinds, and there was next to no change in Californian Brewing. Russian barley fell 6d. to 9d. on the year at Mark Lane, 9d. to 11s. at Bristol; but the supplies on passage on 31st were only 165,000 qrs. of this kind, and holders were confident that value at least would undergo no further recession. There were 300,000 qrs. of 448 lb. Californian and Pacific States barley on passage, also 63,000 qrs. Anatolian, mostly barley for steeping, and of fair weight—424 to 448 lb. to the quarter. The shipments of December were 150,000 qrs. from California and Oregon, 1,562,000 qrs. from Russia, 163,000 qrs. from "Europe, S.E.," and 60,000 qrs. from Anatolia.

Oats.—The average price made for British oats for the first four months of the cereal year was about threepence higher than for the like period of 1908-9. Seeing how unfit for prompt use have been most of the oats tendered since September, the maintenance of value during December, even at 17s. 3d. to 17s. 4d., is matter for congratulation. Imports for the four months showed a great increase on the previous season, but the surplus was restricted to one sort, light Russian 304 lb. oats. The Government returns as required by Statute are in quarters of 312 lb., but buyers of Russian do not, of course, get a 312 lb. quality if they buy by the 312 lb. The extra 8 lb. is made up to them; that is all. American oats are so extremely light, often only 280 lb. to the quarter, that they meet with little sale here. During 1909 there were hardly any imports, for America does not appear to do any speculative business in consigning this article on sale. The shipments of December were 1,097,000 qrs. from Russia and 86,000 qrs. from "Europe, S.E." On the 31st there were 300,000 qrs. on passage. Argentina was offering to ship before the end of January, new oats at 14s. 6d. per 304 lb., direct to London.

Maize—Imports fell much below December requirements and the market was hardening when the month closed. Interest, however, was concentrated for the most part on the contracts with America to ship new crop. These included 25s. per 480 lb. for shipment before January 15th, 24s. 9d. for shipment after that date. There were, however many shippers whose lowest price for any date was 25s. 3d., and with 25s. 6d. paid at New York for spot delivery of the new corn, it was clear that local demand would be served first. There were some transactions in the new Argentine crop to be secured in March and April, shipped in June. The price was 25s. 6d. for fair average quality direct to London. This glimpse of the future does not threaten spot values, and 26s. per qr. looks as if it would rule for maize in 1910 as a London average. The United States has a large crop, and may "bear" the February and March markets, but the probability of this occurring is not considered at the "Baltic" and "Atlantic" exchanges to be appreciable. Shipments in December were 314,000 qrs. from North America, 540,000 qrs. from South America, 205,000 qrs. from Russia, 250,000 qrs. from "Europe S.E.," 25,000 qrs. from Natal, and 10,000 qrs. from Burma. There were 690,000 qrs. on passage on the last day of the month.

Pulse. Chick peas and grain from India fetched 30s. to 31s. per 504 lb., and were in better request than supply. Indian production is so large that some surprise is expressed at the small shipments. More

business is predicted for 1910. There have been buyers of Indian white peas at 7s. 3d. per cential, of Canadian at 7s. 9d., of Chinese at 6s. 6d., and of New Zealand at 14s. Beans have made 30s. per qr. for Chinese, 32s. for Japanese. Little has been done in English pulse. At Alexandria 30,000 qrs. of beans are in granary, against 25,000 qrs. a year ago, but no bids were reported and a price therefore cannot be quoted.

Oilseeds.—Demand for linseed during December completely outran supply, and as the abler operators quickly secured the control of the modest stocks and supplies on passage, very high prices had to be paid by those under contract to deliver seed which they had omitted to arrange for. The prices making at the end of December were 12s. to 13s. per qr. up on the year. It is impossible to say how long 58s. to 59s. per 416 lb. will continue to be made, for Argentina offers prompt shipment of her new crop at 52s. 6d. c.i.f. to London. Any price above 50s. is, however, uncomfortably high for those who have to make linseed cake, and the price of the cake to farmers in the early part of 1910 must apparently needs be high also. Cottonseed has risen to 9s. 6d. per cwt. for Egyptian. At Alexandria 77,000 tons are in warehouse, which is a full average, but the holders are extremely firm. On the last day of the month 75,000 qrs. of linseed and 63,000 tons of cotton seed were on passage.

Farm Seeds.—English red clover seed, remaining scarce all through the month, closed on the 31st at 94s. per cwt. for best, 76s. for secondary, and 70s. for fair average quality. Inferior seed was practically unsaleable. Other farm seed prices at the end of December were 68s. for fine English trefoil, 70s. for suckling clover, 96s. for cowgrass, 12s. for hemp seed, 88s. for lucerne, and 22s. for white mustard seed, all per cwt. Perennial rye grass made 42s. per 224 lb., the "double cwt." by which it is mostly dealt in.

Minor Staples.—Common feeding rice is stationary at 6s. 9d. per cwt. At one period of 1909 it reached 7s. 9d., and at the closing price of December was a good bargain. Common beet sugar for feeding purposes fluctuated between 12s. and 12s. 6d. per cwt., but in July half-a-guinea was accepted, so that the situation has changed markedly on the half-year. Dari has been in slightly increased supply and may be had for 25s. per 480 lb. Canary seed has continued in fair request, the month closing with Mazagan at 49s., Argentine at 47s., and Turkish at 46s.; all per 464 lb.

THE LIVE AND DEAD MEAT TRADE IN DECEMBER.

A. T. MATTHEWS.

Fat Cattle.—The great feature of the month was, of course, the Christmas markets, which in many of the country centres partake of the nature of shows, inasmuch as prizes are given, and animals which win them often make prices far beyond current market values. During the first nine days there was a moderately good supply of fat cattle at most markets, and trade was generally firm. In twenty-two English markets, first quality Shorthorns averaged $\frac{1}{2}$ d. per stone more money in the week ending December 9th than in the preceding week. Herefords, the best of whose season was over, declined slightly, their

average being 8s. 3d. for first, and 7s. 7½d. for second quality. Devons, on the contrary, being well brought out, showed an advance, and averaged 8s. 7½d. and 7s. 10d. Runts fell off a little, and only averaged 8s. and 7s. 5d., and Scots were 8s. 3d. and 7s. 8d. A few of the earliest of the Christmas markets were held in Wales and the West of England, and the quality of the supplies was generally reported as being very good. At Dorchester, the price per head ranged up to £32 10s. The markets showing improvement were Hull, Nottingham, Preston, and Dorchester, but Bristol, Leicester, Ipswich and Norwich were lower.

The Christmas market at Islington on December 13th was successful both in numbers and quality, also in the existence of a good demand. There were about 450 capital Polled Scots which sold at 9s. to 9s. 7d. per stone, the latter being the highest price in any English market reported in the official returns, but some onlookers were of opinion that, in a few cases, that price was exceeded. Prices of this breed, per head, ranged from £25 to £35. These were, of course, the pick of the market, but the Devons made a good second and included a large number of first-rate specimens, which realised up to £34 each, or from 9s. to 9s. 4d. per stone, dead weight. Herefords were fairly supplied, but they were in no way remarkable, and 8s. 9d. was about their top figure. Welsh Runts were very numerous, about 700 head being on offer. As much as £28 was made by one or two, but the general finish was not particularly good, and the price was from 7s. 10d. to 8s. 5d. per stone. Shorthorns were good, but not specially so, and they could not be quoted higher than the previous week. They represented, in fact, the ordinary condition of supplies during the Norfolk season, and they realised from 7s. 10d. to 8s. 5d. per stone. A similar tone prevailed at the Christmas markets throughout the country, but accounts varied greatly as to quality. On the whole, however, it is certain that the Christmas displays were above the average. In twenty-four markets the average of Shorthorns was 8s. 5d. and 7s. 7½d., a rise on first quality of 2½d. per stone and 2½d. on second. The Hereford average was 8s. 4½d. and 7s. 10½d., an advance of 1½d. and 2½d. respectively. Devons averaged 8s. 7½d. and 7s. 10d., which was practically no change from the previous week. Runts showed a more striking advance on ordinary rates, their average coming out well at 8s. 5½d. and 7s. 8d., which was a rise of 5½d. and 3½d. per stone. Scots averaged 8s. 9d. and 8s. 1d., which was an advance of 5d. per stone. The general opinion was that cattle of the ordinary quality were no dearer, but that the apparent advance was owing to the special Christmas condition of the animals.

The extra demand for Christmas having been supplied, there was a great falling off in the numbers and quality of cattle in the week immediately before the holidays. Prices, of course, declined, as was only to be expected, and the Shorthorn average went down to 8s. 2d. and 7s. 4½d. in sixteen markets. Herefords showed a heavy fall, and averaged 8s. 1d. and 7s. 5d.—a reduction of 3½d. and 5½d. Devons also declined, but less heavily, their first quality averaging 8s. 6d. and second 7s. 8d. The average for Runts was 7s. 11½d. and 7s. 5d., or a fall of 5½d. and 3d., and Scots realised 8s. 5½d. and 8s. 2d., giving way 3d. per stone for first quality. The individual markets recording a decline from

Christmas market values, were Derby, Dorchester, Hull, Leeds, Norwich, Preston, Salford, Shrewsbury, and Wakefield, and no single market was quoted higher. In the closing days of the month, there was little transpiring in the live stock markets worthy of notice, but there was nothing to indicate anything approaching weakness in the demand for beef, which was so steady throughout the year.

Veal Calves.—The demand for fat calves is small, as a rule, in the early winter months, especially during cold weather. Supplies this year, however, were small in proportion, and there was occasional sharp inquiry for really good quality. Quotations varied but slightly from week to week, commencing at 8½d. per lb. for first and 7½d. for second quality in the twenty-one markets recorded during the week ending December 9th; at Preston, Ruthin, Salford, and Edinburgh, prime calves fetched 9d. per lb. or over. In the following week, with very cold weather, second quality advanced ¼d., while immediately before Christmas, the average stood at 8½d. and 7½d. for first and second quality. Preston that week was the highest market, where 9½d. per lb. was obtained.

Fat Sheep.—As the month came in, there were signs in several markets that the supplies of prime mutton were beginning to diminish, and in those places there was some advance in values. Leicester, London, York, and Wellington, showed an upward tendency, but at Derby and Shrewsbury there was a decline, and so the average prices both of Downs and Longwools remained unchanged. They were for Downs, 7½d., 6½d. and 5d. per lb. for first, second and third quality respectively, and 6½d., 6d. and 4½d. for Longwools. It is very remarkable that the average for prime Downs should have remained exactly the same for so many weeks, and that their value at so many markets, widely separated, should have been so uniform. This steadiness gave rise to the hope on the part of farmers that the bed-rock of possible values had been reached.

At the London Christmas market on the 13th, there was a really good supply of choice mutton, the 8,750 head present being fully double the ordinary numbers, while by far the larger portion were Hampshires, Oxfords and Norfolks of fine quality, many of them with skins worth 10s. each. Trade was unexpectedly good, and all got sold at a sharp advance on the preceding week. In fact the quotation for Islington was the highest in the reported English markets, and the best for some months. Although 8½d. for prime Down tegs was a fair average for the first quality, there is no doubt that individual lots made 8½d. per lb. Second quality, i.e. wether sheep, of this class also advanced ¼d. per lb., and reached 7½d. per lb. The general average of the country for the week was 7½d. per lb. for first, and 6½d. for second quality. Down ewes also sold better and made 5½d. per lb. The improvement, however, was chiefly confined to the breeds of sheep classed as "Downs," and first quality Longwools remained at an average of 6½d., while second quality sold ¼d. better and touched 6½d., and ewes improved to the same extent and averaged 4½d. per lb. This comparatively greater improvement of the Downs is accounted for by the fact that the Longwoolled varieties are later in lambing, and tegs are seldom brought out before Christmas. The good clearance of a large market at Islington as well as better prices was taken as an encouraging sign, considering that sheep are

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generally neglected on that day, while the first Monday in January is almost always marked by a good trade.

The week ending on the 22nd, though markets were poorly supplied and badly attended, seemed to point to a more healthy state of the sheep trade, for the average value of first and second quality Downs was fully maintained. Longwools of first quality advanced $\frac{1}{4}d.$, but wethers and ewes both fell $\frac{1}{4}d.$ The last market at Islington fell on the 27th, which was Bank Holiday, and buyers were so few that even the 1,120 on offer could not be all sold. A fair business was done in the early morning at a decline of $\frac{1}{4}d.$ per lb. all round.

Fat Pigs.—Pigs were still at a premium, and sold well throughout the month, though there was less excitement in the trade, except in the Christmas markets, where some very sensational prices were realised for very heavy pigs. Anything over £12 is always regarded as a large sum for one animal but there were numerous cases in which £15 and £16 were paid, and one pig at Derby fetched £20 2s. 6d. In the ordinary market, there was no advance the first week, but the average of prime quality again advanced in the second week, and reached 7s. 9d. per 14 lb. stone. Later there was a check, and prices went back 2d. per stone for first and $1\frac{1}{4}d.$ for second quality.

Carcase Beef.—Trade in the dead-meat market experienced considerable fluctuations, but, considering the enormous supplies of chilled and the sudden and violent changes in the weather, the general result of business was quite as good as was expected. The month began with plenty of the lower qualities on offer, but British beef was firm in the first week, Scotch realised $6\frac{1}{2}d.$ to $6\frac{3}{4}d.$ for whole sides, and the small quantity of English of good quality made 6d. per lb., second-rate sides being worth $5\frac{1}{2}d.$ Port killed was in small supply, and sold at $4\frac{1}{2}d.$ to $5\frac{1}{2}d.$ per lb.; Chilled was very cheap, Argentine fetching:—hind quarters $3\frac{1}{2}d.$ to $4\frac{1}{2}d.$ and fore quarters $3\frac{1}{2}d.$ per lb. American hind quarters made $5\frac{1}{2}d.$ to 6d. The low price of this class of beef depressed the trade in frozen, the very best hind quarters of which only made $3\frac{1}{2}d.$ per lb. There was little change in British in the second week, but port killed advanced $\frac{1}{4}d.$ per lb., while the arrivals of chilled were so heavy that Argentine hind quarters declined $\frac{1}{4}d.$ and Americans $\frac{1}{2}d.$ per lb. The weather was very dry and cold, and a brisk business was confidently anticipated for the Christmas market. This was fully realised on Monday and Tuesday, the 20th and 21st, but after that came a sudden rise in temperature, with a humid atmosphere, which was disastrous to sellers, and a rush was made to clear out at any reasonable price. The prices of beef showed a sharp advance during the first two days. Scotch short sides made up to $7\frac{1}{2}d.$ per lb. and whole sides $6\frac{1}{2}d.$ to 7d. English was quoted at $5\frac{1}{2}d.$ to $6\frac{1}{2}d.$, Port-killed at 5d. to $6\frac{1}{2}d.$, and chilled hind-quarters experienced a sharp advance. So great was the call for roasting parts, that even frozen hind-quarters sold rather better; every class of beef, in fact, sold at Christmas prices, except Argentine fore-quarters, which were too heavily supplied to readily clear. Then came the change of weather, and prices fell considerably, making it almost impossible to strike a reliable average quotation.

Veal.—Good veal was scarce at the beginning of the month, and in London as much as $7\frac{1}{2}d.$ per lb. was obtained for choice Dutch, and $7\frac{1}{4}d.$

for English. In the second week, there was really no prime English on offer, and Dutch was quoted a little lower, and trade was limited and very quiet, as the month drew to a close. Two extraordinary carcasses of veal were shown, one from Holland, and one from France. They were said to weigh about 34 stones each (8 lbs.) and were sold at 1s. per lb.

Carcass Mutton.—During the first few days, an effort was made to obtain higher prices for British mutton, which succeeded to the extent of about $\frac{1}{4}$ d. per lb., but even then, Scotch only realised $5\frac{1}{4}$ d. to 6d. per lb., and English $5\frac{1}{4}$ d. to $5\frac{3}{4}$ d.; Dutch fetched 5d., as the top price; and New Zealand frozen $4\frac{1}{4}$ d. per lb. Lamb was selling at $4\frac{1}{4}$ d. for the best Australian, which was about $\frac{1}{4}$ d. per lb. less than a year ago. After a fall to the old level the following week, mutton advanced about a farthing on the 20th, but, like beef, was cheaper with the change of weather.

Pork.—The trade was remarkably steady throughout, and prices showed extremely little variation in London, ruling from $7\frac{1}{4}$ d. to $7\frac{1}{2}$ d. per lb. for the best English.

THE PROVISION TRADE IN DECEMBER.

HEDLEY STEVENS.

Bacon.—Wholesale provision merchants and retailers have not been sorry to see the end of the year 1909. The business throughout has been very trying, on account of abnormal conditions, and the exceptionally high prices prevailing for all hog products, through the scarcity of pigs in practically all countries at the same time.

The working classes, who were large consumers of American bacon in the past, have now been forced to find a cheaper food, on account of the high prices, and in consequence, the year's returns of those handling this article show a large reduction in the volume of business transacted.

Early in December the demand was exceedingly small at all points, but by the middle of the month dealers experienced their usual Christmas demand, although quantities were below the average. Irish and Continental bacon did not show much fluctuation in price until after the holidays, when quotations were mostly cheaper, closing with a range of from 64s. to 74s. (green).

Arrivals from America were somewhat curtailed, but were quite sufficient for the reduced demand, and at the end of the year, spot stocks were a little larger. The latest advices from the United States of America indicate that the present high range of prices will continue well into the New Year. From November 1st to the middle of December, hogs packed in all the western centres of the U.S.A. show a reduction of over a million carcasses, in comparison with the same period last year, the figures being 2,770,000 against 3,865,000. This means that the American packers have very small stocks of cured meats on hand. The top price of hogs was \$8.70 against \$5.80 at the same time last year, and \$4.60 two years back.

Arrivals from Canada continue more free, and spot prices were 2s., to 3s. per cwt. easier at the end of the month, from 64s. to 68s., which Christmas, the average stood at 8 d. and $7\frac{1}{2}$ d. for first and second is about 15s. to 17s. per cwt. over last year's current prices. Canadian

hogs are still in very small supply, although the arrivals at the packing centres were a little more plentiful.

Lard continues very high in price, American refined in pails realising around 70s. per cwt. early in December, but it had dropped to 66s. by the end of the month, this figure being about 15s. per cwt. over last year's price.

The month's demand for English and Irish bacon has been fair. Curers still find it difficult to secure sufficient pigs.

Cheese.—The demand for the entire month was very slow. Dealers continued to adopt the hand-to-mouth policy in their purchasing, which is disappointing to the large holders, as at present prices there is no profit for the importer, and in a good many cases transactions show losses of from 2s. to 3s. per cwt. These conditions have been brought about by the large make of cheese in New Zealand. The arrivals during December were 20,529 crates, say about 41,000 cheese, and the shipments on passage are largely in excess of those at the same time last year. During 1909 we received 298,339 crates from New Zealand, against 200,217 in 1908. (Mostly two cheeses in a crate).

At the end of the month, the estimated stocks of Canadian at the three principal distributing centres (London, Liverpool and Bristol) were 377,000 against 368,000 last year, and 350,000 two years ago.

Holders of cheese in Canada report smaller stocks and very firm markets. Unless our markets advance, Canadian shippers will have to face some serious losses on their holdings. The winter make has been very small, and the United States continued to take the Canadian cream, which can be shipped over the border at a tariff of 5 cents per gallon, against 6 cents per lb. on manufactured butter, equal to 28s. per cwt. One gallon of cream makes about 3 lb. of butter.

A very fair trade passed in English cheese, the demand being chiefly for the lowest priced parcels. Stocks in some districts were reported to be less than last year.

Butter. With prices reasonable, there was a fair consumptive demand throughout the month, but an entire lack of speculation, as, with free arrivals and large shipments close at hand and on passage, dealers buy as required, absolutely refusing to anticipate their requirements. Danish and Swedish were about 12s. 6d. to 20s. above last year's prices, and best Colonial rose from 2s. to 4s. per cwt.

There were no imports from Canada or the United States, their prices being far above an export basis. In the latter country, a price equal to 170s. per cwt. is now being paid for best fresh selections.

Advices from both New Zealand and Australia report the weather conditions favourable, and large quantities of butter and cheese being manufactured for the English markets. The arrivals of butter into London during December from Australia and New Zealand only, were 61,485 boxes (56 lb. nett each) in excess of the same month in 1908.

Stocks of Irish butter were in very small compass by the end of the month.

Eggs.—Eggs were again high in price, with a continued scarcity of fresh English, although there were more on offer than in November. There was a good demand for best selections of pickled. In Montreal, new-laid eggs have been making 40 cents (1s. 8d.) per dozen on the market.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and SCOTLAND
in the Month of December, 1909.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	ENGLAND.		SCOTLAND.	
	First Quality.	Second Quality.	First Quality.	Second Quality.
FAI STOCK:—	per stone *	per stone. *	per cwt. †	per cwt. †
Cattle:—	s. d.	s. d.	s. d.	s. d.
Polled Scots	8 7	7 10	41 5	37 1
Herefords	8 3	7 9	—	—
Shorthorns	8 3	7 6	40 0	36 3
Devons	8 7	7 10	—	—
	per lb. *	per lb. *	per lb. *	per lb. *
	d.	d.	d.	d.
Veal Calves	8½	7½	8½	6½
Sheep:—				
Downs	7½	6½	—	—
Longwools	6½	6	—	—
Cheviots	7½	6½	7½	6½
Blackfaced	6½	5½	6½	5½
Cross bred	7½	6½	7½	6½
	per stone *	per stone. *	per stone. *	per stone. *
	s. d.	s. d.	s. d.	s. d.
Pigs:—				
Bacon Pigs	7 9	7 3	7 9	6 9
Porkers	8 4	7 10	8 0	7 0
LEAN STOCK:—	per head	per head	per head	per head.
Milking Cows:—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk	22 6	18 10	22 13	18 0
„ —Calvers	21 17	18 10	20 6	17 2
Other Breeds—In Milk	19 7	15 15	20 2	16 9
„ —Calvers	—	14 7	19 1	16 9
Calves for Reaning	2 3	1 12	2 13	1 17
Store Cattle:—				
Shorthorns—Yearlings	9 17	8 5	9 16	8 4
„ —Two-year-olds	13 17	12 7	14 5	11 17
„ —Three year-olds	16 0	14 16	15 10	—
Polled Scots—Two year-olds	—	—	17 3	13 19
Herefords—	15 15	14 3	—	—
Devons—	13 16	11 10	—	—
Store Sheep:—				
Hoggs, Hoggets, Tegs, and Lambs—	s. d.	s. d.	s. d.	s. d.
Downs or Longwools	31 6	25 11	—	—
Scotch Cross-breds	—	—	—	17 10
Store Pigs:—				
Under 4 months	26 9	19 10	20 1	17 7

* Estimated carcass weight.

† Live weight.

**AVERAGE PRICES of DEAD MEAT at certain MARKETS in
ENGLAND and SCOTLAND in the Month of December, 1909.**

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Quality.	London.	Birming- ham.	Man- chester.	Liver- pool.	Glas- gow.	Edin- burgh.
		per cwt. <i>s. d.</i>	per cwt. <i>s. d.</i>	per cwt. <i>s. d.</i>	per cwt. <i>s. d.</i>	per cwt. <i>s. d.</i>	per cwt. <i>s. d.</i>
BEEF :—							
English	1st	56 6	53 0	50 0	—	60 6*	57 6*
	2nd	52 6	49 0	46 6	—	53 6*	51 6*
Cow and Bull ..	1st	41 0	45 0	44 0	41 0	44 0	43 6
	2nd	32 6	40 0	38 0	36 0	32 0	37 6
U.S.A. and Cana- dian :—							
Port Killed ...	1st	55 6	50 6	51 6	50 0	51 0	—
	2nd	45 0	45 0	46 0	45 0	46 0	—
Argentine Frozen—							
Hind Quarters...	1st	30 0	32 6	31 6	31 6	32 0	33 0
Fore " ...	1st	26 0	28 0	26 6	26 0	28 6	28 0
Argentine Chilled—							
Hind Quarters...	1st	39 6	40 6	38 0	37 6	41 6	40 0
Fore " ...	1st	28 0	29 6	28 6	28 0	31 6	29 6
American Chilled—							
Hind Quarters—	1st	55 0	57 0	57 0	56 6	—	57 0
Fore " ...	1st	36 0	36 6	36 6	36 0	—	37 6
VEAL :—							
British	1st	71 0	59 6	74 6	78 6	—	—
	2nd	61 0	51 6	67 0	70 0	—	—
Foreign	1st	70 6	—	—	—	—	68 0
MUTTON :—							
Scotch	1st	56 0	59 0	61 0	61 6	56 6	49 6
	2nd	51 0	53 6	56 6	57 0	43 0	42 0
English	1st	52 6	57 0	57 6	55 0	—	—
	2nd	48 6	51 6	52 6	50 6	—	—
U.S.A. and Cana- dian—							
Port Killed ...	1st	—	—	—	—	—	—
Argentine Frozen ...	1st	33 6	34 6	34 6	34 6	32 6	33 0
Australian " ...	1st	32 0	33 6	32 0	32 0	32 6	—
New Zealand " ...	1st	38 6	—	—	—	—	—
LAMB :—							
British	1st	—	—	—	—	—	—
	2nd	—	—	—	—	—	—
New Zealand ...	1st	41 0	42 6	40 0	40 0	49 0	—
Australian ...	1st	39 0	38 6	38 6	37 6	35 0	—
Argentine ...	1st	41 0	38 0	37 6	37 6	35 0	—
PORK :—							
British	1st	67 6	72 6	75 6	75 0	65 6	66 6
	2nd	63 0	67 0	71 0	70 6	60 6	56 6
Foreign	1st	65 6	59 6	—	—	—	—

Scotch.

AVERAGE PRICES of British Corn per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1907, 1908 and 1909.

Weeks ended (in 1909)	WHEAT.						BARLEY.						OATS.					
	1907.		1908.		1909.		1907.		1908.		1909.		1907.		1908.		1909.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Jan. 2 ...	26	0	35	1	32	0	23	11	26	9	26	7	17	3	18	4	17	4
" 9 ...	26	1	35	2	32	9	24	2	26	9	26	11	17	4	18	3	17	5
" 16 ...	26	1	35	5	32	8	24	1	27	1	27	1	17	5	18	5	17	5
" 23 ...	26	2	35	6	33	2	24	5	26	11	27	3	17	5	18	5	17	8
" 30 ...	26	3	35	0	33	0	24	4	26	11	27	6	17	5	18	4	17	9
Feb. 6 ...	26	6	34	3	33	4	24	5	26	9	27	7	17	7	18	3	17	10
" 13 ...	26	7	33	1	33	8	24	1	26	9	27	8	17	7	18	0	17	11
" 20 ...	26	10	32	6	34	1	24	2	26	5	27	11	17	9	17	11	18	0
" 27 ...	26	9	30	11	34	5	24	2	26	3	28	0	17	9	17	8	18	0
Mar. 6 ...	26	8	30	5	34	10	23	11	26	1	27	11	17	11	17	8	18	2
" 13 ...	26	10	31	3	35	8	24	2	26	0	28	4	18	0	17	10	18	2
" 20 ...	26	10	31	7	35	9	24	0	26	2	28	0	18	1	17	11	18	5
" 27 ...	26	8	31	4	36	0	23	9	25	10	28	0	18	2	17	10	18	6
Apl. 3 ...	26	9	31	3	36	5	24	3	25	5	27	10	18	3	17	9	18	8
" 10 ...	26	8	31	2	37	4	23	9	25	10	28	0	18	6	17	7	18	10
" 17 ...	26	8	30	11	38	7	23	3	26	1	27	8	18	7	17	7	19	2
" 24 ...	26	10	30	10	41	4	23	3	25	5	28	2	18	9	17	9	19	9
May 1 ...	27	0	31	6	42	5	23	6	25	8	27	10	19	3	18	0	20	0
" 8 ...	27	6	32	4	40	9	24	0	25	5	27	7	19	7	18	4	20	3
" 15 ...	28	4	33	1	41	6	23	10	24	9	27	3	20	1	18	7	20	6
" 22 ...	29	7	33	8	42	8	24	3	25	9	27	0	20	5	18	10	20	11
" 29 ...	31	4	33	5	42	6	24	0	24	6	26	3	20	8	18	8	21	0
June 5 ...	32	0	33	1	43	1	24	7	25	10	25	7	20	7	18	4	21	3
" 12 ...	31	10	32	7	42	11	24	7	24	5	26	10	20	11	18	4	21	4
" 19 ...	31	4	32	0	42	7	24	11	24	2	26	10	20	9	18	5	21	6
" 26 ...	31	2	31	5	42	8	24	6	24	0	27	2	20	8	18	7	21	7
July 3 ...	31	3	30	11	42	9	24	8	23	11	27	2	20	11	18	7	21	9
" 10 ...	32	0	30	5	43	0	24	10	24	4	26	4	20	11	18	5	21	8
" 17 ...	32	6	30	7	43	3	24	6	23	1	26	10	21	1	18	5	21	9
" 24 ...	32	11	31	5	44	0	27	3	26	5	27	4	20	8	18	6	22	5
" 31 ...	33	2	31	10	43	5	26	4	24	4	24	6	21	2	18	7	22	2
Aug. 7 ...	33	5	31	6	44	9	26	6	23	1	27	4	21	3	18	9	22	11
" 14 ...	33	6	31	6	44	9	25	9	23	10	24	9	20	4	18	1	21	8
" 21 ...	33	7	31	2	41	6	25	0	24	5	23	11	19	8	17	10	19	8
" 28 ...	33	10	30	10	38	5	24	6	24	5	24	7	18	11	17	1	19	4
Sept. 4 ...	31	11	30	10	37	2	24	2	25	5	26	3	17	7	17	3	19	6
" 11 ...	31	4	31	5	34	11	24	4	25	11	26	1	17	6	17	6	18	5
" 18 ...	31	5	31	7	33	6	25	0	26	0	26	5	17	6	17	3	17	9
" 25 ...	31	8	31	5	32	9	25	3	26	8	26	8	17	8	17	2	17	7
Oct. 2 ...	32	6	31	7	32	2	25	5	26	11	26	9	17	9	17	2	17	2
" 9 ...	33	3	31	5	31	8	25	9	27	5	26	9	17	11	17	0	17	0
" 16 ...	34	4	31	2	31	4	26	3	27	6	27	0	18	0	17	0	17	0
" 23 ...	35	9	30	11	31	8	27	2	27	5	27	7	18	7	16	11	16	11
" 30 ...	36	3	30	8	31	10	27	7	27	5	27	9	18	10	16	11	17	0
Nov. 6 ...	35	10	30	11	32	5	27	8	27	6	27	9	18	10	17	0	17	0
" 13 ...	35	1	31	2	32	5	27	8	27	4	27	7	18	8	17	0	17	1
" 20 ...	34	7	31	10	32	7	27	5	27	3	27	0	18	9	17	3	17	4
" 27 ...	34	7	32	3	33	0	27	5	27	2	26	8	18	7	17	5	17	3
Dec. 4 ...	34	7	32	7	33	3	27	1	27	2	26	1	18	6	17	4	17	4
" 11 ...	34	8	32	8	33	3	27	0	27	0	25	7	18	5	17	4	17	3
" 18 ...	34	9	32	9	33	2	27	1	26	9	25	3	18	3	17	3	17	4
" 25 ...	34	6	32	2	33	1	26	10	26	8	25	2	18	0	17	2	17	4

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates; Wheat, 60 lbs.; Barley, 36 lbs.; Oats, 39 lbs. per Imperial Bushel.

CORN PRICES:—ANNUAL AVERAGES.

AVERAGE PRICES of **British Corn** per Quarter of 8 Imperial Bushels, computed from the Weekly Averages of Corn Returns from the Returning Markets, together with the QUANTITIES returned as sold at such Markets during each of the Years 1903 to 1909.

YEARS.	PRICES.			QUANTITIES.		
	Wheat.	Barley.	Oats.	Wheat.	Barley.	Oats.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	Quarters.	Quarters.	Quarters.
1903 . .	26 9	22 8	17 2	2,296,723	2,875,749	1,049,995
1904 . .	28 4	22 4	16 4	2,138,142	3,437,176	1,316,516
1905 . .	29 8	24 4	17 4	2,467,551	3,265,613	1,073,611
1906 . .	28 3	24 2	18 4	2,684,101	3,210,995	1,011,931
1907... .	30 7	25 1	18 10	2,722,847	3,317,521	1,374,260
1908. .	32 0	25 10	17 10	3,293,506	3,293,916	1,304,223
1909... .	36 11	26 10	18 11	2,641,225	2,699,628	905,983

AVERAGE VALUE per IMPERIAL QUARTER OF WHEAT IMPORTED into the UNITED KINGDOM from the under-mentioned Foreign Countries and British Possessions in the years 1907, 1908, and 1909.

Countries from which consigned.	Average Value per Imperial (Quart r.		
	1907.	1908.	1909.
	<i>£. d.</i>	<i>s. d.</i>	<i>s. d.</i>
Argentine Republic . .	31 6	35 6	39 10
Chile	36 8	35 1	39 1
Germany	25 0	33 7	38 3
Bulgaria	25 9	35 10	—
Rumania	30 3	38 4	40 8
Russia	32 7	38 3	39 3
Turkey	31 1	36 8	32 4
U.S. of America	33 5	36 2	38 6
India, British	33 9	37 8	40 8
North America, British . .	34 2	35 2	39 3
Australia	33 8	37 7	41 5
New Zealand	—	—	40 6

AVERAGE PRICES of Wheat, Barley, and Oats per Imperial Quarter in FRANCE, BELGIUM, and GERMANY, and at PARIS, BERLIN, and BRESLAU.

		WHEAT.		BARLEY.		OATS.	
		1908.	1909.	1908.	1909.	1908.	1909.
		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
France :	November	38 4	39 7	25 9	25 4	20 0	20 4
	December	38 3	39 9	25 10	25 6	20 0	20 8
Paris :	November	39 4	40 3	25 0	24 8	20 10	19 8
	December	39 6	41 1	23 3	24 8	20 7	20 5
Belgium :	October	34 3	35 11	25 3	24 2	19 11	19 5
	November	33 8	36 4	25 1	23 9	19 11	19 6
Germany :	October	42 1	44 1	31 1	27 6	22 2	21 2
	November	41 10	43 7	31 0	27 5	21 11	21 0
Berlin :	October	43 10	47 2	—	—	22 11	21 3
	November	44 3	46 8	—	—	23 0	21 7
Breslau :	October	41 3	41 10	30 8 (brewing)	27 2 (brewing)	21 1	20 4
				26 0 (other)	25 1 (other)		
				31 6 (brewing)	27 2 (brewing)		
				26 0 (other)	25 1 (other)		
	November	40 11	44 1			21 1	20 4

NOTE.—The prices of grain in France have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*; the Belgian quotations are the official monthly averages published in the *Moniteur Belge*; the German quotations are taken from the *Deutscher Reichsanzeiger*, the prices for the German Empire representing the average of the prices at a number of markets.

AVERAGE PRICES of British Wheat, Barley, and Oats at certain Markets during the Month of December, 1908 and 1909.

		WHEAT.		BARLEY.		OATS.	
		1908.	1909.	1908.	1909.	1908.	1909.
		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
London ..	..	33 10	34 2	26 7	24 5	18 6	19 1
Norwich	.	32 8	32 11	26 5	24 4	17 3	17 2
Peterborough	.	31 10	32 0	26 0	25 8	17 0	16 7
Lincoln...	.	31 10	32 9	27 0	26 2	17 2	17 0
Doncaster	...	32 2	32 4	27 3	26 1	17 2	17 1
Salisbury	...	32 8	33 3	26 11	25 10	16 10	17 3

**AVERAGE PRICES of PROVISIONS, POTATOES, and HAY at certain
MARKETS in ENGLAND and SCOTLAND in the Month of
December, 1909.**

(Compiled from Reports received from the Board's Market Reporters.)

Description.	London.		Bristol.		Liverpool.		Glasgow.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
BUTTER :—	per 12 lb	per 12 lb	per 12 lb	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British	16 3	14 3	15 0	14 0	—	—	15 0	—
	per cwt.	per cwt	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery	117 0	113 0	121 0	114 6	—	—	—	—
„ Factory	105 0	103 0	105 6	101 0	103 0	96 0	—	—
Danish	127 0	125 0	—	—	128 6	126 0	126 0	—
Russian	111 0	107 0	111 0	101 6	111 6	107 0	112 0	108 0
Canadian	—	—	114 6	110 6	—	—	—	—
Australian	111 0	109 0	114 6	102 6	112 0	110 0	113 6	109 6
New Zealand	115 0	112 6	117 6	111 0	115 0	113 0	115 6	—
Argentine	114 0	109 0	117 6	114 6	112 0	109 6	112 6	—
CHEESE :—								
British—								
Cheddar	83 0 120 lb.	71 0 120 lb	74 0	60 6	74 6 120 lb.	72 0 120 lb	65 0	58 6
Cheshire	84 0 per cwt.	76 0 per cwt	—	—	80 0 per cwt	71 6 per cwt.	—	—
Canadian	58 0	57 0	58 0	56 0	57 6	55 6	58 0	55 0
BACON :—								
Irish ..	71 6	68 6	72 6	69 0	70 0	67 0	73 0	70 6
Canadian	66 6	66 0	66 6	65 6	65 0	63 6	—	—
HAMS :—								
Cumberland	117 0	104 0	—	—	—	—	—	—
Irish ..	112 0	101 6	—	—	—	—	92 0	80 0
American (long cut)	67 0	64 6	68 6	64 6	67 0	60 6	65 0	62 0
EGGS :—	per 120.	per 120	per 120	per 120.	per 120.	per 120.	per 120.	per 120.
British	19 2	17 6	18 4	—	—	—	—	—
Irish ..	16 4	14 6	17 2	16 6	15 11	14 6	16 10	13 2
Danish	16 10	13 6	—	—	15 6	14 8	16 8	13 10
POTATOES :—	per ton	per ton.	per ton.	per ton	per ton.	per ton.	per ton.	per ton.
Langworthy	80 0	70 0	75 0	65 0	78 6	70 0	54 0	48 0
Scottish								
Triumph	70 0	60 0	66 6	57 0	53 6	48 6	—	—
Up to Date	70 0	60 0	70 0	60 0	53 6	48 6	49 0	41 6
HAY :—								
Clover	103 6	78 0	85 0	70 0	99 0	68 0	82 6	77 6
Meadow	94 6	72 0	75 0	60 0	—	—	—	—

DISEASES OF ANIMALS ACTS, 1894 to 1909.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

DISEASE.	DECEMBER.		TWELVE MONTHS ENDED DECEMBER.	
	1909.	1908.	1909.	1908.
Swine-Fever :—				
Outbreaks	104	132	1,650	2,067
Swine Slaughtered as diseased or exposed to infection	725	1,392	14,316	14,096
Anthrax :—				
Outbreaks	115	92	1,316	1,105
Animals attacked	144	104	1,700	1,419
Foot-and-Mouth Disease :—				
Outbreaks	—	—	—	3
Animals attacked	—	—	—	112
Glanders (including Farcy) :—				
Outbreaks	23	48	536	789
Animals attacked	51	118	1,751	2,433
Sheep-Scab :—				
Outbreaks	124	117	685	849

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

DISEASE.	DECEMBER.		TWELVE MONTHS ENDED DECEMBER.	
	1909.	1908.	1909.	1908.
Swine-Fever :—				
Outbreaks	1	4	88	159
Swine Slaughtered as diseased or exposed to infection ...	8	62	1,570	3,625
Anthrax :—				
Outbreaks	—	1	8	8
Animals attacked	—	1	8	11
Sheep-Scab :				
Outbreaks	51	51	424	382

ADDITIONS TO THE LIBRARY.

[NOTE.—The receipt of annual publications of foreign agricultural and other departments, experiment stations, and societies is not noted in the monthly list of additions to the Library. A list of all these publications received appeared in the *Journal* for October, November, and December, 1909.]

Agriculture, General and Miscellaneous—

- Warming, E.*—Oecology of Plants. (422 pp.) Oxford: The Clarendon Press, 1909. 8s. 6d. net.
- Giglioli I. and Rosso-Ferrini U.*—Insegnamento Agrario e Forestale ed Associazioni Agrarie nell' Italia, nel Belgio, nella Francia, con notizie su alcune Istituzioni Agrarie della Gran Bretagna, della Russia, della Bulgaria. Milan: Capriolo and Massimino, 1909.
- U.S. Department of Agriculture, Division of Publications.*—Circ. 6:—Publications of the United States Department of Agriculture, and how they are distributed. (3 pp.) Washington, 1909.
- U.S. Department of Agriculture, Office of Experiment Stations.*—Circ. 91:—Secondary Education in Agriculture in the United States. (11 pp.) Washington, 1909.
- U.S. Department of Agriculture, Bureau of Chemistry.*—Circ. 14:—Organisation of the Bureau of Chemistry. (29 pp.) Circ. 46:—The Occurrence of Pinene in Lemon Oil. (24 pp.) Washington, 1909.
- Memoirs of the Geological Survey, England and Wales.*—The Geology of the Country around Basingstoke. (119 pp.) London: E. Stanford, 1909. 2s.
- Deutsche Landwirtschafts-Gesellschaft.*—Agrarverfassung und Landwirtschaft in Belgien (Berichte über Land und Forstwirtschaft im Ausland, Buchausgabe, No. 18). (555 pp.) Berlin: Paul Parey, 1909.
- University of Wisconsin, Agricultural Experiment Station.*—Bull. 179:—The Eradication of Farm Weeds with Iron Sulphate. (17 pp.) Bull. 180:—Fertilisers for Wisconsin Farms. (46 pp.) Wisconsin, 1909.
- New Zealand, Department of Lands.*—The Public Domains of New Zealand: a Synopsis of the Annual Reports of Domain Boards for the year ended December 31st, 1908. (47 pp.) Wellington, N.Z., 1909.
- Wright, C. T. Hagberg.*—Subject-Index of the London Library.* (1254 pp.) London: Williams and Norgate, 1909.
- U.S. Department of Agriculture.*—Farmers' Bulletin No. 375:—Care of Food in the Home. (46 pp.) Washington, 1909.
- Bentham, G., and Hooker, Sir J. D.*—Handbook of British Flora. (584 pp.) Illustrations of the British Flora. (347 pp.) London: L. Reeve and Co., 1908. 9s. net each.
- Hole, R. S.*—A Manual of Botany. (250 pp.+plates.) Calcutta: Superintendent of Government Printing, India, 1909.
- Ewart, A. J. and White, Jean.*—Contributions to the Flora of Australia, No. 11. (21 pp. and plates.) No. 12. (23 pp. and plates.) Royal Society of Victoria, 1909.
- Ewart, A. J.*—The Weeds, Poison Plants, and Naturalised Aliens of Victoria. (110 pp. and plates.) Melbourne: J. Kemp, Government Printer, 1909. 2s. 6d.
- Canada, Inland Revenue Department.*—Bull. 191:—Bran, Shorts, Chop-Feed. (49 pp.) Bull. 192:—Copper in Vegetables. (11 pp.)—Ottawa, 1909.

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HOP CULTIVATION.

ARTHUR AMOS, B.A.

FROM the time when hops were first grown commercially in England until about the year 1870 no striking improvements had been introduced into the methods of hop cultivation. The ground was usually well manured with dung and the hops were trained upon poles; no effort, however, was made to combat the various insect and fungous diseases to which hops are subject.

In the year 1882 one of the most serious attacks of aphid ever known visited the English hop gardens and totally ruined the crop in many districts; a few growers, however, had learnt by this date that by washing with a solution containing soft soap the aphid could be killed, and these growers succeeded in growing a normal crop which sold at very high prices. This signal success opened the eyes of growers generally to the fact that the hop aphid could be destroyed by washing, and stimulated investigation in other departments of hop growing, with the result that many other improved methods have now been introduced, among which may be cited the general use of sulphur to prevent hop mould, the use of some system of stringing for hop training, improvements in manuring, especially with regard to the use of phosphates, and lastly, the introduction of the new systems of hop drying by the aid of hot air and fan draught, instead of by the furnace gases and natural draught.

The effect of these improvements has been not only to raise the average crop per acre in normal years, but to make the

crop much more certain in years of blight; and at the present time, although the acreage under hops in England has been reduced within the last 30 years by approximately one half, the average total crop remains about the same.

Selection of Site.—The first problem that confronts a grower when contemplating the growth of hops, is the selection of the position for his garden. The hop crop employs a very much larger amount of manual labour than the majority of farm crops—roughly it requires one man to about six acres—and in order to be able to obtain sufficient manual labour there must either be a large number of cottages upon the farm or else the farm must lie near some town or village where the labourers can live. Much of the work upon a hop farm, moreover, requires more or less skilled labour, and in order to obtain men skilled in this work the farm should be situated in a hop-growing district.

Large quantities of manures and other stores are required, and the crop itself has to be marketed, consequently proximity to a railway station or water carriage is a great consideration. Further, large supplies of water are needed for hop washing, and consequently the hop farm should be situated near a good water supply.

Climate.—The hop is a plant that flourishes best in a medium climate; extremes of heat and cold, as well as drought and rain, are unfavourable. The hop grows only for a comparatively short period each year, but during this period produces a large amount of foliage, consequently its roots require a large supply of water, and frequent showers during May, June, and early July are necessary to promote a vigorous growth. Sunny and warm weather during the end of July, August, and September is very favourable to the growth and production of the hops themselves, in the earlier part of the time because it is favourable to pollination of the “burr” of the hops, and during the latter because it enables the hops to ripen a better colour, and possibly aids in the formation of the resins in the cones.

Winds which prevail whilst the hops are ripening, especially if accompanied by rain, bruise the hops and turn them brown, so that a sheltered spot should be selected; and it may be noted that many of the principal hop areas are situated in

river valleys. Shelter is particularly necessary on the south-west side, since the prevailing winds in the ripening period are from this quarter.

Soil.—Hops can be grown over a fairly wide range of soils provided that the manuring is arranged to supply those elements of plant food lacking in the particular soil, and provided also that varieties are selected suitable to each soil. The best quality Golding hops grow to perfection upon deep loamy soils, especially if these overlie the chalk; they are grown well upon a brick-earth soil, and also upon light loams, though upon this latter soil the crop is not usually so large. Fuggles thrive especially well upon a cool, heavy clay soil, such as the Weald clay.

Light sandy soils and gravelly soils are not suitable because of insufficiency of moisture.

Hops do not thrive upon wet or water-logged soils, and it is found that many of the hills in such situations die away during the winter; hence all hop gardens should be naturally or artificially well drained.

An ideal soil for hops is a deep, rich loamy soil overlying chalk at a depth of about 6 feet.

Planting a Garden.—Under normal conditions it takes three years for a hop garden to reach its prime. Hop “sets” are planted-out in the autumn or spring of the first year and in favourable seasons, if well tended, produce a small crop the first year. Usually, however, the crop is not large enough to be worth picking; nevertheless, it is very important that the plants be well tended during the first year, because upon their development in this year depends to a large extent the vigour of growth in the second and third years.

In the second year growth is much more vigorous and the hops produce from half to three-quarters of a full crop; in the third year the garden is in its prime.

Preparation for Planting.—Hops are usually planted after a corn crop, though they may be planted after any other crop except late folded roots; broken pasture, except for the prevalence of wireworm, also makes an excellent tilth for hops owing to its high content of organic matter.

A good coat of dung (from 20 to 40 tons per acre) is usually carted on the corn stubble and spread, and then the land is

deeply ploughed; sometimes the land is subsoiled as well as ploughed, but this practice is not now so common as formerly. The operation is probably beneficial in aiding drainage, but great care must be taken not to bury the top soil.

Setting-Out.—The field is next set out with sticks to mark the position of the hop hills; the standard distance apart is 6 ft. 6 in. each way, and is convenient in that it requires approximately 1,000 plants per acre; however, many growers make the width of alley somewhat greater—7 ft. or 8 ft; this enables the carting of the dung to be done more easily. In the Worcester system the alleys are from 7 ft. to 8 ft. wide, but the hills are planted only 3 ft. 6 in. apart in the rows.

Planting.—Hops are commonly planted at two periods in the year, either in November or in March. In the former case the sets become firmly fixed in the ground before growth commences, which is very advantageous, because then the sets do not dry out; in the latter case, when planted in March, the sets begin to grow soon after being planted, and are less likely to be damaged by insects and other pests after planting. In either case the ground should be in good order for planting, that is, neither too dry nor too wet.

When planting, the roots of the set are trimmed off, a hole is made in the ground with a "dibber," and the set is firmly pressed into the hole so that the crown of the set is level with the surface of the ground, and the soil is pressed tightly against it.

Another method of planting is to dig a small hole about a foot deep, put about 3 in. of well-rotted dung in the bottom, cover the dung with earth and plant the set firmly in the soil above the dung; this method is not to be recommended because as the dung decays the hop plant is liable to become loose at the root.

If the sets are good one set only is planted to form each hop hill, but if the sets are weak then two may be planted to each hill; this latter practice is naturally not so good as planting one good set and should not be employed unless good sets are unobtainable.

When purchasing sets for planting care should be taken to ascertain from the vendor that these contain a fair proportion of male plants amongst them (about five per 1,000). It

has lately been proved by Howard, Salmon and the writer* that the presence of male hops flowering at the time when the particular hop is in "burr" is a very important factor in determining the weight of crop produced, since in the absence of males the hops hang in burr a long time and finally produce small seedless hops, whereas in the presence of suitable males well-grown and seeded hops are produced.

Subsequent Treatment.—Although it rarely happens that any crop worth picking is grown the first year, the hop-grower takes great trouble to make the plants grow as vigorously as possible the first year, because the second year's growth and crop depend very largely upon the first year's growth, and upon the reserves which the plant stores in its root-stock at the end of the first year.

To obtain this good growth the manuring is heavy and upon similar lines to that which will be described later under general manuring of hops; and in addition to the ordinary manuring, a dressing of 5–10 cwt. of some nitrogenous artificial manure, such as fish guano, is often hoed in close to the young hills in the spring.

Sometimes short poles (5 or 6 ft. long) are put one to each hill, the hop vines being trained to them; in some cases, however, no poles are put up in the first year, but during July the hop shoots are just tied into a knot above the crown of each hill. The former practice is best since it gives the plant a better chance to develop.

A crop of mangolds or potatoes is usually grown between the rows of hops the first year, but these should not be planted close to the hops. Beans are also sometimes grown between the hops.

Annual Operations.

Manuring.—In the cultivation of hops under the present conditions in England the expenses of washing for aphids, sulphuring for mould, erection of wirework, training, etc., are so great that it is important to obtain as large a crop as possible in order that these expenses may be as small as possible per cwt. of crop; for this reason the amount of manure applied to a hop garden is very great compared with

* *Journal of the South-Eastern Agricultural College, 1905, 1908, and 1909.*

that applied to other farm crops. At the same time, care should be taken that the manuring (especially as regards nitrogenous manures) is not overdone, because this will lead to the production of rank sappy bine, which is readily attacked by mould, is a very suitable feeding-ground for aphides, and tends to produce thin and low-quality hops.

Experiments* carried out over a number of years by Wye College in different parts of Kent and Surrey have shown that the hop (unlike many other farm crops) is a general or all-round feeder, and has no special requirements for any one of the elements of plant food. The problem of manuring any hop garden, therefore, is mainly concerned with the question : What elements of plant food are deficient in the particular soil upon which the hops are being grown ?

Nitrogen and Organic Matter.—These are classed together because, for the most part, manures containing nitrogen contain organic matter at the same time; nitrate of soda and ammonium sulphate are notable exceptions.

In the growth of all plants the supply of nitrogen is mainly concerned with the production of foliage; insufficient nitrogen in the soil will lead to an insufficient growth of bine, and excess of nitrogen will lead to excess of sappy bine.

All hop gardens require an annual dressing of nitrogen, and this is usually supplied by carting out 15-20 tons of dung per acre yearly during the autumn and winter months. If the supply of dung on the farm is not sufficient to manure all the hops at this rate the deficit is made good by applying 1-2 tons per acre of shoddy or some other bulky nitrogenous and organic manure.

In addition to this winter dressing, a spring dressing of 5 or 6 cwt. of guano or meat meal, or 1 or 2 cwt. of sulphate of ammonia or nitrate of soda, is applied in May or June, particularly if the hops for any reason start to grow badly or if they receive a check in any way.

Some growers manure their hops still later in the year—in July, but it is doubtful whether this is a wise plan, as it is likely to delay ripening and encourage disease.

Phosphates.—The above-quoted experiments carried out by Wye College show that upon nearly all soils hops respond

* A. D. Hall, *Journal of the South-Eastern Agricultural College*, 1902.

in increased weight of crop to moderate dressings of phosphates, and upon clay soils to very heavy phosphatic dressings.

Owing to the fact that phosphates, unlike nitrogen, are not directly concerned with leaf production, but are concerned with the ripening processes, excessive phosphatic manuring need not be feared in the same way as excessive nitrogenous manuring. It is, of course, true that after a certain point is reached increases in the phosphatic manuring do not lead to increased weight of crop, but little damage is likely to accrue from such excess.

The amounts of phosphates usually applied for heavy clay soils' deficient in lime are from 5-10 cwt. of basic slag (since this contains some lime) to be sown in the autumn. Superphosphate should not be used upon these soils.

Upon loamy soils containing lime, 3-5 cwt. of superphosphate, or the phosphate equivalent of this in the form of steamed bone flour or other bone compound, should be applied in the early spring. Some growers delay putting on phosphates till late in the summer, but these should be put on early so as to become well mixed with the soil. There is no danger of loss of phosphates from drainage as they are rendered insoluble in the soil.

Upon the lighter sandy loams phosphates are not so highly important as upon the clay soils; nevertheless, it is expedient to supply a small dressing annually or biennially. Further, since these soils are often deficient in lime, steamed bone flour or phosphatic guano is the best form in which to supply phosphates, or basic slag may be used; but superphosphate and dissolved bones should not be applied by themselves without the addition of lime.

Potash.—The application of potash for hops is not so important as phosphoric acid, because most of the soils upon which hops are grown contain sufficient of this element in an available form, or the deficiency is made good by the potash in the dung. The value of potash to plant growth lies in lengthening the period of growth of the plant and is therefore mostly needed on sandy loams, which tend to dry out, and upon these soils it is advisable to apply 2 or 3 cwt. of sulphate of potash or double the quantity of kainit.

Again, if shoddy has been continuously applied to a garden in place of dung, it may be advisable to apply a small dressing of potash, or, since the shoddy contains no potash, the supply of this constituent of plant food in the soil will tend to become too small for the wants of the hop.

Lime.—It is probable that lime could be profitably applied to hop gardens far more generally than is the case at the present day.

Lime is beneficial to soils generally and to hop gardens in particular in many ways: First, the decay of all kinds of organic matter is hastened by the admixture of lime, so that the constituents of plant food in the organic matter become more quickly soluble and therefore available as plant food. Secondly, by the decay of organic matter acids are formed in the soil which make the soil "sour" and unkindly; the application of such acid manures as superphosphate and dissolved bones also renders the soil acid. Now, the addition of lime to the soil neutralises these acids and makes the soil sweet, and since in hop gardens applications of organic manures and acid phosphates are very large, the supply of lime is very important. Moreover, lime improves the texture of the soil and makes it lighter and more easy to work.

The soils that are most likely to be deficient in lime and to be benefited by applications of the same, are alluvial soils, such as some of those soils upon which hops are grown about Farnham, and heavy clay soils. Upon such soils as these an annual application of half a ton of lime per acre may be profitably made; on many brick-earths and other hop soils also a dressing of half a ton of lime once in four years, costing little, is likely to do much good.

If lime cannot be readily obtained and chalk is near, two tons of this may be substituted for half a ton of lime.

Cultivation.—*In Winter.*—As soon as the hop vines have been cleared and the dung has been carted and spread, the winter cultivation can be commenced, and the sooner it is done the better it is for the soil; it should, if possible, be finished by the end of March.

The cultivation may be done by digging all the ground, or the middle of the alleys may be ploughed, and the slips, between the hills only, hand dug. By the former method

the ground is left more even than by the latter, but the cost is somewhat greater. One advantage of digging lies in the fact that it is a means of keeping the men on the farm all through the winter, and so the hop-grower ensures a supply of labour for the summer work in the hop gardens which he may otherwise find it difficult to obtain.

The objects of the winter cultivation are firstly to break up the soil, which has been trodden down hard by the pickers, and leave it well exposed to the air and to the frost in winter; secondly, to bury and so kill any weeds, &c., that may have started to grow; and thirdly, to bury the dung or shoddy which has been carted on, so that the decay of the organic matter may commence.

Upon some of the very wet and heavy soils, especially in the Weald of Kent and Sussex, no late autumn or winter cultivation is done, but a deep furrow is made with a baulk plough down the centre of each alley, and the soil displaced by the plough is raked up along each row of hills. This baulk ploughing is done either just before or just after hopping.

The object of this operation is to enable the water to drain quickly away from the hop garden so that the hop hills may be comparatively dry through the winter.

In March, when the ground begins to dry, it is ploughed back into the centre of the alley from either side.

Spring and Summer Cultivation.—Cultivation with special cultivators is begun in April as soon as the ground is dry enough to allow it, and is continued at frequent intervals throughout the summer. During the early part of the year the cultivation is taken to a depth of from four to six inches, and in some cases when the cultivation is done by a steam implement the ground is broken to a depth of seven or eight inches; as the summer advances the majority of growers do not set the tines so deeply in the soil and are content to move only about two or three inches of soil; some growers, however, believe in cultivating deeply when the hops are in burr.

The object of the summer cultivation is in the first place to aerate the soil and so help on those processes that render the manures available as plant food; of secondary importance are the killing of the weeds and the levelling of the ground

so that the horse washing-machines and sulphurators can do their work more effectually.

Some growers continue cultivating up to within one or two weeks of picking, but it is doubtful whether cultivation after the burr has turned into hop is profitable, because in the event of wet weather setting in, the cultivation is likely to lead to a fresh growth of bine, when fresh burr is produced and the hops ripen in two crops, a condition very detrimental to the quality of the sample.

Cutting.—Hop hills are cut or pruned each spring for the purpose of preventing the root stock from becoming too cumbersome and keeping it in its proper position.

The best time of year for cutting is during February and March; if the operation is delayed till April, the hills will have begun to grow and the operation checks the hills and may result in a weak growth of bine.

For the purpose of cutting, which should not be done in very wet weather, the hills are first cleaned from soil with forks and hoes, and then the straps, the remains of last year's bines, are cut off about one quarter-inch from the root stock, leaving one row of buds upon that part of each strap which is attached to the root stock; from these buds shoots eventually develop. At the same time that the straps are removed all runners, *i.e.*, underground shoots, are cut off close to the stock.

After cutting, one or two inches of fine soil are usually raked over the crown of the hill to keep off the frost.

SYSTEMS OF TRAINING.—At the present day the majority of English hops are trained upon some system of sloping string supported by a wire framework on poles. These systems, although necessitating a greater initial outlay, have within the last 30 years gradually been displacing the older method of training round poles, mainly because much larger crops can be grown upon the string and wirework.

For the purpose of classification, systems of training may be divided into three classes:—

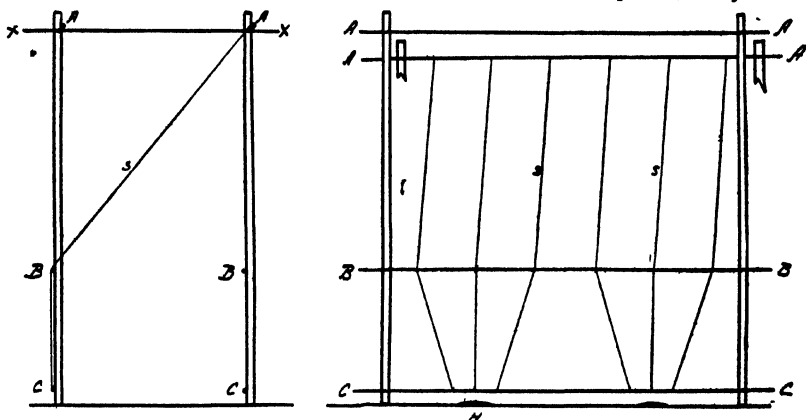
(i.) *Butcher System*, in which all the strings in each alley slope in one direction only, the direction of this slope being usually from south-west to north-east so that the dangerous south-westerly gales of August and September strike upon

the backs of the sloping hops and cause a minimum of damage.

In this system the hills are usually planted 6 ft. 6 in. apart both ways, though in many gardens the width of the alley is now somewhat greater (7 or 8 ft.) to allow dung carts to pass more readily.

A row of stout poles is set in each row of hop hills, one pole being placed to every two or three hills; the poles stand usually 12 or 13 ft. out of the ground. Three parallel wires are fixed to each row of poles; the bottom wire is about 6 in. above the ground, the middle wire about 4 ft. 6 in. high, and the top wire about 6 in. from the tops of the poles.

Each hill has three strings; the strings are tied at equal distances apart on the top wire of one row of poles; they



BUTCHER SYSTEM OF TRAINING HOPS

A A, top wires; *B B*, middle wires; *C C*, bottom wires; *X X*, cross strain wires; *H*, hop hills; *S*, strings.

FIG. 1.—End view.

FIG. 2.—Side view.

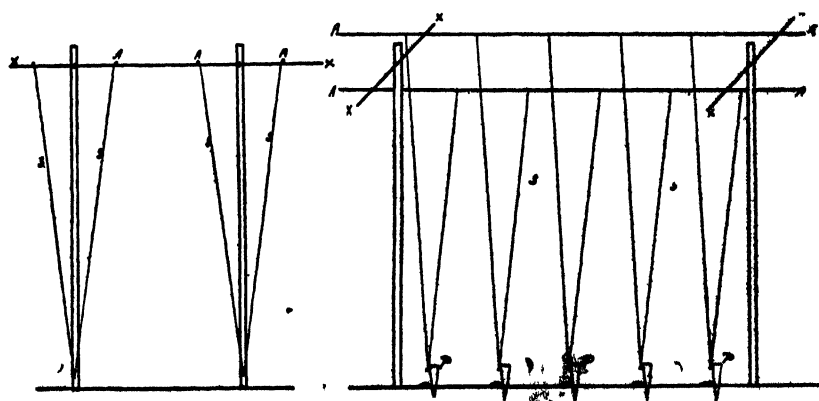
slope across the alley to the middle wire of the next row, to which they are hitched at equal distances apart; from the middle wire three strings converge to each hop hill and are tied to the bottom wire immediately above it. See Figs. 1 and 2.

If the hills are 6 ft. 6 in. apart, each string is 2 ft. 2 in. from the strings on either side as they slope across the alley; in windy weather, especially in wide alleys, the hops upon one string are liable to chafe against those on the neighbouring strings, and in order to minimise this a cross string is twisted round each sloping string half-way across the alley,

so that when the wind blows all the strings swing up or down together instead of swinging independently and so chafing.

In the Butcher system, as mentioned above, all the strings throughout the garden slope in one direction, consequently, when the strings are laden with bines and hops there is a very great strain in this direction upon the wire and poles. In order to withstand this strain stout wires are fixed to the tops of the poles at right angles to the string wires, and these wires need to be very securely fixed to "hold fasts" at the outside of the garden to counteract this strain. If these straining wires break or give way the whole of the wirework is likely to fall down flat, and consequently it is most important that these shall be strong and secure.

(11.) *Worcester System.*—Unlike the Butcher plan the



WORCESTER SYSTEM OF TRAINING HOPS.

A A, top wires; K X, cross strain wires; P, poles; S, strings.

FIG. 3.—End view.

FIG. 4.—Side view.

strings in this system slope in two directions opposite to each other.

The width of the alleys is from 7 to 8 ft. and the hills are planted more closely in the rows, being usually 3 ft. 6 in. apart.

The wires are arranged quite differently from those in the Butcher system; there are no bottom and no middle wires. There are two top wires which run parallel to each other 4 ft. apart down the middle of each alley and are supported by being bound upon cross wires, which are in turn fixed to the poles. See Figs. 3 and 4.

A stump is driven into the ground by the side of each hill and the strings are tied to nails driven into these stumps.

Sometimes two and sometimes three strings are tied to each hill; these are tied to the nearest top wires on either side of the row of hills and slope down almost vertically to the stumps; thus, in each alley there are two sets of sloping strings—one to each row of hills on either side.

Since the strings slope in opposite directions it is obvious that the strain of one set of strings balances that of the other set, and there is not the great strain in one direction as in

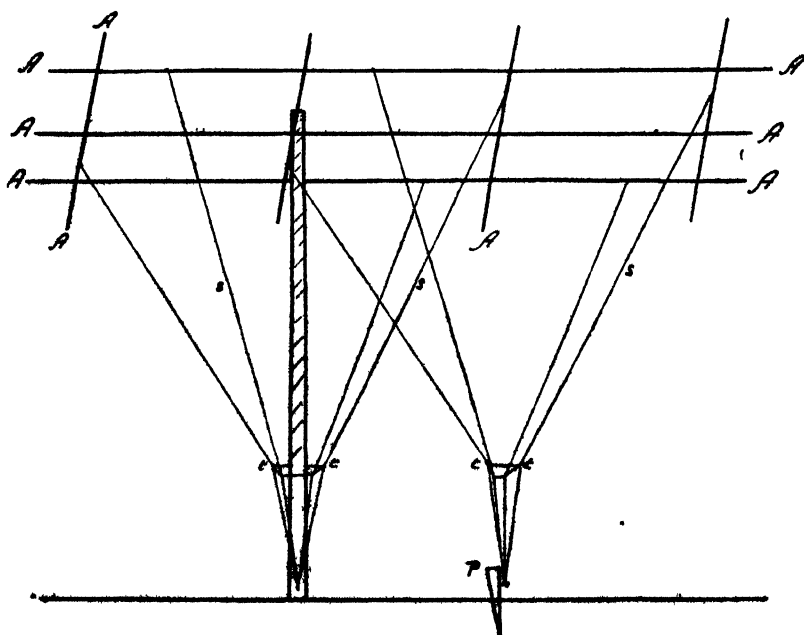


FIG. 5.—UMBRELLA SYSTEM OF TRAINING HOPS.

A, top wires; *S*, strings; *T T'*, coupling strings; *P*, stump.

the Butcher system, and the cross-wires here are merely to hold up the string wires. In this system the chief strain is due to the weight of the hops on the parallel string-wires, which tend to pull inwards, and it is therefore at the ends of these wires, at the outsides of the garden, that the greatest strain is produced, consequently it is here that the winework needs to be secure.

(iii.) *Umbrella System*.—In this system the strings slope in four directions.

The hills are usually planted 6 ft. 6 in. apart in both directions.

As in the Worcester system there are no bottom or middle wires, and stumps with nails take the place of the bottom wires.

The top wires and poles are so arranged that two wires cross one another immediately above the centre of each hill.

Four strings are put to each hill; these start from the top wires and slope in on four sides and are fixed to the stumps somewhat loosely, then the four strings of each hill are tightened by being tied together at a height of about 4 ft. 6 in. See Fig. 5.

As in the Worcester system the strain is equal in all directions and the wirework needs to be firmly anchored at all the outside points.

There are various other systems of training now in use, but they are for the most part modifications of the three described above.

At this stage it may be well to compare the relative advantages and disadvantages of the various training systems, as it cannot be said that any one system is the best, but each in turn excels in various points which may be summarised as follows:—

(i.) *Quantity of Crop*.—Closely-planted systems, or at least systems with the greatest number of strings per acre, usually produce the greatest crop, and this is especially the case in unfavourable seasons when adverse weather conditions or aphids may have checked the growth of the bine; and as it is in these adverse seasons that the price of hops is usually highest the greater yield of the closely-planted systems is of considerable importance.

(ii.) *Quality of Crop*.—The systems with broad alleys and fewer hills and strings produce the best quality hops, especially in years when the crop is large, when the thickly-planted gardens will tend to produce a large number of thin, undeveloped hops.

(iii.) *Cost of Cultivation*.—The initial cost of hop-sets and planting is greatest in the closely-planted systems, as is also the annual cost of cutting, earthing and slip digging, and the cost of string. On the other hand, training costs more in

the wider alleys and flatter slopes, and if the Butcher alleys are more than 8 ft. wide, the amount of labour required becomes prohibitive. The Worcester system, with its almost vertical strings, is the cheapest so far as training is concerned.

The cost of horse cultivation is least in alleys about 7 ft. wide : if wider than this cultivators have to be sent twice in the alley and so the operation costs more; in the Umbrella system cultivating can be done both ways so that a portion of the hand cultivation can be dispensed with.

Dung carting can be carried out much more economically in the wider alleys; if the latter are less than 7 ft. wide, the dung has to be carted in trolleys at greater expense.

(iv.) *Washing*.—For purposes of washing with horse-machines the Butcher system is the best, because since all the bines on the strings in each alley lie in one plane, they do not shelter one another, and each nozzle of the machine can be accurately adjusted according to the height of the leaves it is intended to wash; in the Umbrella system a certain amount of crossing of the bines on the strings is bound to occur, and each nozzle is expected to spray at one time upon leaves close to it, and at another time upon the tops of the strings and cannot be adjusted to perform both operations satisfactorily.

(v.) *Resistance to Wind Damage*.—From this standpoint the Butcher system, in which the sloping strings are connected together by a cross string, is much the best, provided that the wind beats upon the backs of the slope. In the Worcester, and especially the Umbrella system, many of the hops get bruised by the chafing of neighbouring strings.

(vi.) *Prevalence of Mould*.—Mould spreads most rapidly and does most damage in closely-planted systems when the bines get matted together at the top, and prevent an adequate supply of sun and air to the foliage and hops.

Tying and Training.—The hop hills begin to grow in April, and the bines usually attain a length of about 2 ft. by the end of the month; the first few bines produced are usually coarse and "pipey," and are generally supposed to be less fruitful than the later shoots; before tying begins, therefore, these coarse shoots are pulled out, more bines being pulled from the strong hills than the weak, so that

when tying begins the shoots on all the hills are approximately equal in length: it is sometimes necessary to repeat this operation two or three times before tying.

If the hills do not shoot regularly they should be examined to see whether the young shoots on the weak hills are being attacked by wireworms, and if so the wireworms should be trapped by burying pieces of mangold by the side of the hop hills. The wireworms eat their way into the pieces of mangold and can then be picked out by hand and killed by being dropped into boiling water.

Tying was the term originally employed to describe the operation of tying the hop shoots with rushes or bast to the old-fashioned poles, and the term is still retained to describe the first part of the operation of training the hop vines upon the strings.

It is usually started about the 7th of May, when the vines are about 2 ft. high; in some cases on rich land with heavy manuring, or with late varieties, the operation is not commenced for a week or ten days later, and the hills are consequently "pulled" once more. Sometimes three and sometimes two vines are trained up each string, and in either case the vines should be carefully divided out so that the growth of the vine upon each string may be as nearly equal as possible. .

The work of tying is mainly done by women, whose business it is to see that the tips of the shoots are kept to their right strings until they have grown out of reach from the ground.

When all the strings have been fully furnished the superfluous shoots are pulled out. These shoots continue to be formed during the summer and are pulled out as soon as they have grown sufficiently long. The "runners" also which spread underground must be kept pulled out as they appear; neglect of this operation is likely to encourage the growth of the hop mould, since the fungus lying dormant in the ground during the winter begins to grow in the early summer on the lowest leaves close to the ground.

As the summer goes on and the vines grow up the strings, the side shoots and leaves up to a height of 4 or 5 ft. are stripped off. These lower leaves are very difficult to wash

effectually, especially by horse-machines, and if allowed to remain form a breeding-ground for the hop aphid, while they also enable the hop mould to spread. On the other hand it should be remembered that these leaves are of great value to the plant since they are able to take in carbonic acid gas from the air and utilise it in making food material for the rest of the plant; therefore, when these leaves are stripped off the growth of the bine is checked to a certain extent. As a general rule the lower leaves should not be stripped before the bines have nearly reached the top wire. Experiments* upon the effect of stripping carried out at Wye College during the years 1898 to 1901 showed that in years when there is a big crop and a free growth of bine, stripping affects the crop but slightly, but in years when the bine is scanty, injudicious and early stripping may reduce the crop by 20 per cent.

The training proper is carried out by men or women with short ladders or stools; it consists in just twisting up any of the shoots that have failed to climb the string naturally or have been blown away by the wind; the more nearly the slope of the string approaches a vertical position the less training do the hops require, and *vice versa* the flatter the slope the more training is necessary.

This operation of training is most important, and careless or neglected training may result in a loss of crop of 2 or 3 cwt. per acre.

HOP WASHING.—In a previous article† in this *Journal* by Mr. Fred. V. Theobald, the life-history and habits of the hop aphid have been described in detail, and the best remedies have been there indicated. It will not be necessary to go over the ground again, but the practical side of hop washing will be dealt with.

In the article above referred to, the writer recommends a wash composed of soft soap and either nicotine or quassia extract as being the best remedy for this disease. Unfortunately, nicotine is very costly and is therefore not much in use; the majority of growers, who prepare their own wash,

* A. D. Hall, *Journal of the South-Eastern Agricultural College*, 1902.

† *Jour. Board of Agric.*, Nov. 1909.

employ the mixture of soft soap and quassia dissolved in water.

The preparation of this wash, which is now almost universally used, involves the use of a large copper or tank in which to boil up and extract the quassia. In the absence of these appliances the grower has perforce to make use of proprietary washes, which are more expensive.

Materials.—The quassia is usually purchased in the form of chips, and care should be taken to see that these are very small, and also quite dry.

The soft soap should contain but little free alkali, since this is the constituent which causes the scorching of the hop leaves if present in too great a quantity in the wash; it is not necessary that it should be entirely absent, since a small quantity of free alkali is rather an advantage as it increases the lathering power of the soap.

The main point about a soap is the readiness with which it forms a lather in water.

Method of Mixing.—The first step in the preparation of the wash is to make a concentrated extract of the quassia and dissolve the soft soap in this, so that this concentrated extract can be diluted to the necessary strength as required.

The quassia chips are first put into the copper or tank and water is poured upon them; at least one gallon of water should be added to 1 lb. of quassia chips, otherwise the chips will be imperfectly extracted and much of the "bitter" will be wasted. The water is brought to the boil and kept simmering for two or three hours. The extract is then run off or ladled out as the case may be. If time will allow, the quassia chips should be boiled up a second time before being thrown away, as they still contain much "bitter," and a fresh lot of quassia can then be extracted, using the same liquid, containing the second extract from the first lot of quassia.

The soft soap should be weighed out and dissolved in the quassia extract whilst this is still hot, since the soap dissolves much more readily in hot water. It is convenient to dissolve 1 lb. of soap in one gallon of extract so that when finally diluting to the requisite strength for washing, the figure giving the number of gallons of "liquor" to 100 gallons of water is the same as the figure for the pounds of soap to the 100 gallons.

Strength of Wash.—In order that the aphid may be killed by the wash, it is necessary that the strength of the soap solution shall be such that, when sprayed upon the bodies of the aphid or lice, it forms a thin soap-film (impermeable to air) all over their bodies and so blocks up the minute "pores" or air passages of the lice, which are, in consequence, suffocated.

In soft water comparatively little soap is required and a lather is soon obtained, but if the water is hard part of the soap is used in converting the hard water into soft water, and consequently much more soap is required to kill the aphid.

When the water is exceptionally hard it is profitable to soften the water with washing soda and leave it to stand for half an hour before adding the soap.

In all cases the best plan is to mix the wash so strong that when a little is put into a pail and stirred up with a stick, the resulting lather remains on the surface of the liquid for at least five minutes. The usual strength is from 6 to 12 lb. of soap to 100 gallons of water.

If the leaves are wet, and especially on dewy mornings, when not only the upper but also the lower sides of the leaves are wet with dew, 2 or 3 lb. of soap extra should be added, since otherwise the dew dilutes the strength of the wash and the lice escape destruction. Neglect of this precaution often leads to inefficient washing.

If mould is running upon the foliage it is a good plan to add 1 lb. of liver of sulphur to each 100 gals. of this mixture of soft soap and quassia; but care should be taken to employ only freshly-prepared liver of sulphur for the purpose. If exposed to the air and kept a long time, or if left for some time dissolved in water, the liver of sulphur is rapidly decomposed and the wash not only does no good but the precipitated sulphur is likely to block the nozzles.

Force of the Spray.—Another factor of equal importance to the strength of the soap solution is the force with which the spray is applied. In order that the leaves may be well washed, and especially the folds in the young half-grown leaves where the aphides congregate, it is necessary that these be hit by the spray with considerable force. If the spray is too fine it does not penetrate into the folds of these young leaves and the aphides escape destruction. Many growers

prefer to see a few leaves knocked off by the force of the wash as an indication that there is plenty of force and that the aphides are receiving a good drenching.

When to Wash.—This is one of the most difficult of the problems which the hop-grower has to face, for there are many conflicting circumstances that have to be taken into account.

The aphides begin to arrive about the beginning of May and sometimes continue until the end of July, though usually the last batches come about the middle of that month. It is therefore useless to exterminate the early arrivals if the later ones are left to thrive. On the other hand, the aphides must never be allowed to accumulate thickly enough upon the leaves to check in any way the growth of the plant. Again, the hop-grower is assisted by one natural enemy of the aphid, the ladybird and its larvæ, which in favourable seasons (*e.g.*, 1908) are sufficient by themselves to keep the aphid in check for a considerable time and so save the grower the expense of washing. Unfortunately, washing kills both ladybird and aphid; nevertheless, washing must never be delayed on this account, and, if there is any danger of the aphid checking the plant, washing must be done at once. Further, it must be remembered that the aphid can be much more effectually killed whilst the foliage is thin; when growth becomes dense the leaves shelter each other from the wash, and so the aphides escape. Finally, when the young hops begin to form and the aphides get into these, washing can do but little good.

The plan of the hop-grower should be to keep the insects well in check during the earlier part of the season, and when July comes and the winged aphides begin to cease coming he should concentrate all his efforts to clean his hops before the hop cones form. Lastly, it is most important that the late hops (the last pickings) shall be clean, because whilst it is sometimes possible to gather the earlies before these are quite ripe if the aphides become dangerous, this is not possible in the case of the late hops.

TYPES OF WASHING MACHINES.—Hop washing machines may be divided into three classes according to the power used to produce the force.

(i.) *Hand Washing Machines.*—A hand washing machine

consists of a tank on wheels with pump attached which supplies two nozzles at the end of rods fixed to rubber hose. One man works the pump and two others each hold and direct one nozzle.

This was the first type of machine used for hop washing, but it has now been largely replaced by horse and steam machines on account of the large amount of manual labour it requires.

In some cases a hand machine is still very useful for purposes of thoroughly cleaning the outsides of the garden which are liable to be missed by the horse machine, or in the case of an early blight when the hops are but a few feet high and cannot be effectually washed by horse machines; or again, they are useful in a protracted spell of wet weather when the ground may become too soft to allow the horse machines to work.

(ii.) *Horse Washing Machines*.—A horse washing machine consists of a tank (capacity about 60 gallons) on wheels, and is drawn by two or three horses. The most modern machines contain three pumps, the pistons of which are so connected with the bent axle of the machine that as the machine is drawn through the hop garden, and as the wheels revolve, the pistons of the three pumps are forced home in sequence, with the result that a steady pressure is kept up on the liquid instead of a jerky one. The liquid is forced by the pumps into a reservoir which in turn is connected by strong rubber hose to a series of nozzles, through which the wash escapes in the form of a coarse spray.

The nozzles should be so arranged that as far as possible every hop leaf is thoroughly wetted by the spray.

Each of the nozzles, some of which are fixed to the sides of the machine and some to the rack fixed above the machine, should be adjusted at a distance of about 2 ft. below the leaves they are intended to wash. This will not be possible in the case of the nozzles which are directed upon the topmost leaves, but these should be as high as possible. Further, the nozzles should be nearly or quite vertical so that the wash strikes full upon the lower sides of the leaves where the insects are for the most part situated; if otherwise, and the spray has a horizontal direction, the leaves double up and parts of the lower sides of the leaves are not touched by the

wash, with the result that the aphides upon these parts escape unhurt.

The nozzles that are directed upon the topmost leaves, and which are therefore at a greater distance than 2 ft. from the leaves, should be adjusted to give a coarser spray than the lower nozzles so as to ensure the spray hitting these with plenty of force.

Horse washing machines of the most up-to-date pattern do their work very efficiently. It must be remembered, however, that the ends of the alleys are liable to be somewhat imperfectly washed owing to the difficulty of drawing the machine at full speed at the beginning of the alley, and consequently the outsides need in most cases to be washed by hand.

Again, in very wet weather the wheels of the machines skid in the soft ground and consequently will not work the pumps, with the result that the operation has to be stopped.

(iii.) *Steam Washing*.—In steam washing, as it is usually called (though the force may be equally well derived from an oil engine as from a steam engine), the engine and pump remain fixed near the water supply throughout the season.

The wash is led from the pump through fixed iron pipes to stand pipes situated at frequent distances throughout the garden.

From the stand pipes the wash is led through rubber hose to the nozzles and these nozzles are directed upon the hop leaves by manual labour.

The nozzles are fixed to brass rods 5 or 6 ft. long. The value of the rods lies in the fact that the men can hold the nozzles as close to the topmost leaves as desired.

This method is in many respects superior to that of horse washing. It can be equally well employed when the bines are short as when they have reached full height. Further, parts of the garden which are more badly blighted, or where the foliage is more dense, can be given a more thorough washing than where the blight is less severe or the foliage less dense.

Moreover, a wet state of the ground does not hinder washing by this means as in the case of horse washing.

In general, steam washing is the most effective means of

washing hops, but owing to the manual labour it requires, and to the fact that more wash is required per acre than in horse washing, the cost is considerably greater.

Sulphuring.—The life-history of the hop mould will be described in a later article, but it may be said now that it exists through the winter in the soil and that it first reappears in the spring upon the lower leaves where, if unchecked, it rapidly spreads to the upper leaves and eventually to the hops themselves.

In dealing with hop mould, although the necessity is not at first sight obvious, it is even more important than in the case of washing for aphids to begin early.

The period at which the mould does its greatest damage is when the hops are in "burr"; firstly, because the delicate structure of the "brush" forms an ideal position for the mould to commence to grow, and secondly, because when once established upon the burr the mould prevents it from developing into hops, in which case hard white knobs are formed. The grower should therefore aim at keeping the hops absolutely free from mould until the burr has turned into hop; by this means he will get none of the mouldy knobs in the ripe hops because, after the hops are once **formed**, they are far more resistant to the mould than is the burr.

Sulphuring should be started as soon as the hops have been put to the string when they are about 3 or 4 ft. high; at this stage the sulphuring is best performed by a knapsack sulphurator.

With this machine a stream of sulphur is directed upon the under surface of the leaves so that some sulphur is deposited upon both sides of the leaves.

It is important that the sulphur be thus directed because the mould so frequently commences to grow upon the under-surface of the leaves, where it is liable to escape detection.

By the use of this apparatus 7 lb. of sulphur is sufficient for one acre of hops, so that the cost is trifling. This operation should be repeated once a fortnight until the vines have nearly reached the top wire. At this stage sulphuring by hand may be discontinued because the lower leaves will now be stripped off.

Should mould be present upon the upper leaves the garden

should be sulphured with the horse machine, and by this means be kept well in check until the burr has developed into hop; it is always a good plan to sulphur the hops when they come into burr, and so prevent the mould beginning to grow on the delicate "brush" of the "burr."

In sulphuring with the horse machine it is not necessary at each sulphuring to draw the machine down each alley, because the sulphur is very light and will drift over two or three alleys. The sulphurator can therefore miss one or two alleys, and when the garden is next sulphurated the machines should be drawn down the alleys previously missed.

Still days should always be selected for sulphuring so that a maximum of sulphur remains on the leaves. In windy weather the sulphur is simply blown away. Further, it is preferable to sulphur when there is a slight dew on the leaves, because the sulphur then hangs to the leaves more readily.

As a rule it should not be necessary to sulphur hops after the hops are once formed, but in the event of red mould spreading from the white mould sulphuring must be continued until the hops are nearly ready to pick.

WIND POWER.

W. R. DUNLOP.

THE modern steel windmill is typical of modern success in the concentration of natural power. It has become, both to maker and user, one of the most satisfactory of engineering achievements, for it works efficiently under the crudest and most variable of conditions—such conditions that few other machines have to contend with.

The constantly changing wind velocity, the veering of the wind, the full exposure to rain and snow, and the continual variations of temperature are no easy factors with which to effect a compromise; no other prime mover has so many variables depending upon it as the windmill, and few machines call for more sound investigation before a really efficient machine can be placed upon the market. Moreover, when one considers that the total cost of the machine is the small annual charge for interest on capital, depreciation and

maintenance, one realises the cheapness of this form of power.

Uses.—The chief uses of the modern windmill are for (1) pumping and (2) power. Windmills for pumping are employed to supply water for farms, estates and villages, and are also used for drainage and irrigation purposes. A more extensive use of the windmill in the two latter directions would, in many instances, prove economical. Much land in this country subject to unfavourable moisture conditions could be rendered productive through the use of the windmill.

Power windmills are mostly used for driving farm machinery, and for the generation of electricity. Wind power is particularly useful for such operations as chaffing, pulping, grinding, churning, and sawing. For the production of electricity specially constructed dynamos and storage batteries are now manufactured and, with a proper plant, the application of wind power in this direction gives most satisfactory results.

*Principles of Construction.**—The main differences between the pumping and power windmills lie in their strength and type of gearing. Power mills usually exert a higher horsepower than pumping windmills. The principles of construction are, however, much the same in both types. The older patterns of windmills were provided with wooden wheels and vanes and no governing arrangements beyond a brake. It is characteristic of the modern mills to be provided with a properly constructed steel wheel and spring governor. The wheel has a framework composed of a bracket with numerous arms, to which are attached the sails. Their length, width, thickness, and distance apart, and the angle at which they are set, all make a difference to the efficiency of the machine and can only be determined after scientifically conducted experiments. The wheel (Fig. I., *W*) is kept at a suitable angle to the wind by the vane (*V*) and governing arrangements. The advantage of the spring governor (*G*) is made manifest by watching a mill of the old type working in a gusty wind. With every increase of wind velocity the rate of revolution is suddenly increased, and the resulting jerky motion must

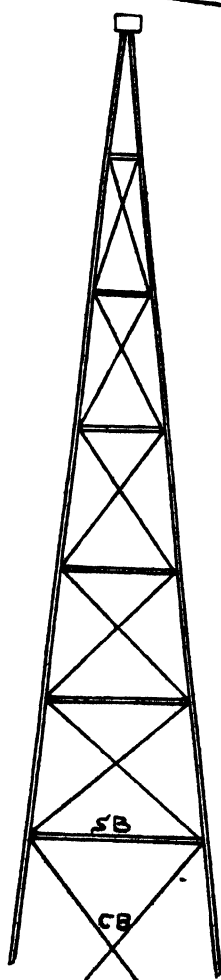
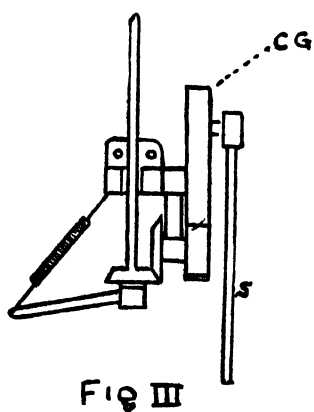
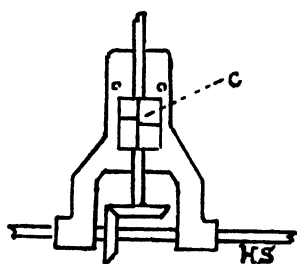
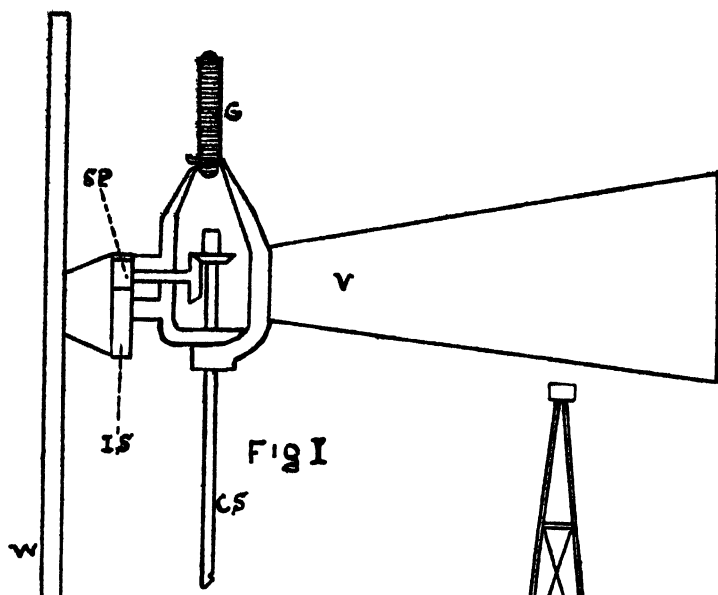
* For an account of some of the different types of pumping mills on the market, see *four. Roy. Agric. Soc.*, vol. 64, 1903.

have a very deteriorating effect not only upon the gearing, but upon the whole structure generally.

The gearing of the machine varies in the different types, the most important distinction being that in most pumping mills it is arranged so that the crank is at the wheel-head, and the centre shaft running down the tower assumes the function of a long pump-rod having an up and down movement. In power mills, on the other hand, the movement of the centre shaft (Fig. I., *CS*) is rotatory, driving a foot-gear (Fig. II.) which, in its turn, engages a horizontal driving shaft (Fig. II., *HS*), thus transferring the power into a neighbouring building. Power mills, unlike pumping mills, can be used for both purposes, and a special pump gear for this purpose (Fig. III.) can be affixed at the base of the tower. In some of the older machines the line shaft was made much heavier than was necessary. Under any circumstances the friction on the foot-gear is great, but this has been much reduced not only by lightening the shaft, but by providing a ball bearing at the base of the shaft. Improving the gearing in this, and similar ways, increases the efficiency of the machine. Owing to the great exposure to which windmills are subjected, all external iron work should be galvanised, and all bearings lubricated at least once a week. The life of the machine is thereby greatly lengthened.

Towers.—The tower (Fig. IV.) which supports the machinery is a very important factor influencing the efficiency of the machine. The older types of towers, like the present home-made ones, were constructed of wood, but modern towers are built of riveted steel girders braced both horizontally and diagonally. Three-post towers are generally used for pumping mills, and four-post for power mills. The tower must always be high enough to expose the wheel freely to the wind, a general rule being that the base of the wheel should be elevated 15 ft. above any obstruction within 600 ft. of the windmill. Most steel towers are made in 10 ft. sections. The foundation of the tower should consist of four blocks of concrete with an anchor-post embedded in each.

Management.—The management of the modern windmill is comparatively simple, but it demands on the part of the



PRINCIPLES OF CONSTRUCTION OF A TYPICAL MODERN POWER WINDMILL.
(For description, see p. 910.)

owner some knowledge of the theory of wind power. With any motor it is always desirable to know how much work it can be expected to do, what power it is exerting at any particular time, and the working conditions under which it suffers least from depreciation. The necessity of having this knowledge has been realised by such firms as the Stover Manufacturing Company, Illinois, U.S.A., to whom the writer is indebted for much technical information concerning the management of windmills.

The windmill derives its power from the kinetic energy of the moving atmosphere: the greater the velocity of the wind the greater the power transmitted, providing the mill is suitably constructed.

It should be taken as a general rule that for any given velocity of the wind the speed of the wheel should not change, but the load should be arranged and the governor adjusted to suit any particular wind velocity. The mean average wind velocity varies for different localities; but a pretty good idea can be formed of the mean velocity of any one centre by taking an average of the velocities which have been determined at two or three places near where the windmill is to be erected.

The mean average velocity increases with increase in elevation: double the elevation and the mean average velocity is also nearly doubled. This shows the value of high towers. Now the value of wind velocity, or its capacity for doing work, increases in the ratio of the squares of the different velocities. For instance, the value of a 20 mile-per-hour wind compared with a 10 mile-per-hour wind is $(20)^2 : (10)^2$ or $\frac{400}{100} = 4$. That is, if the value of a 10 mile-per-hour wind be regarded as 1, the value of a 20 mile-per-hour wind is four times this value.

The mean average velocity of the wind should always be taken into account in adjusting the load. A 16 ft. mill in a centre of low mean average wind velocity must be provided with a lighter task than one in a centre of higher average velocity. It has been determined that wind below 8 miles per hour has a lower percentage of working power than where the mean average velocity is over 8 miles per hour. The

difference is roughly in the ratio $2:2\frac{1}{2}$. Now, supposing the mean average velocity for a certain spot is 7 miles per hour, this value multiplied by 2 ($=14$) gives the comparative wind value for which the mill should be governed. Again, supposing the mean average wind velocity were 15 miles per hour, then $15 \times 2\frac{1}{2} = 37\frac{1}{2}$ is the value in this case for which the machine should be governed. It is obvious that when the governor begins to act the wheel has reached its maximum speed, for at this point it has begun to be turned out of the wind. The speed of the wheel is transferred to the shaft, so that at this point the shaft must also be revolving at its maximum rate. In most of the modern mills the highest speed of the shaft should not be more than $\frac{2}{3}$ greater than at its lowest velocity.

Therefore, let v = velocity at which mill is to govern and v_1 = velocity at which mill is to be loaded. Then $\frac{60}{100} v = v_1$.

Under these conditions the mill will begin to work when the wind reaches a velocity equal to v_1 , and the speed of the machinery will increase until the velocity $= v$ is reached, and the speed will then be at a maximum, because v is the velocity at which the mill is adjusted to govern.

Knowing the velocity at which the mill should be loaded, it is next necessary to determine what power is exerted at this velocity. In order to arrive at this some standard must be taken as a unit. For this purpose a 15 miles-per-hour wind has been selected, because this is nearly equal to 1 lb. pressure on 1 sq. ft. It is generally allowed that a 12 ft. windmill of best construction, and working in a 15 miles-per-hour wind, will develop very nearly 1 horse power gross.

The power developed by any mill can be determined approximately from the following formula:—

$$\text{Horse power} = \frac{AV^3}{1080000}.$$

Where A = area of sails.

V = velocity of wind in feet per second.

The area of the sails varies and must be determined for each make of mill, but as a working formula the sails may be regarded as occupying 65 per cent. of the total wheel area.

Animal and Wind Power Compared.—H.P. represents

mechanical horse power—the capacity of a machine to work at the rate of raising 33,000 lb. 1 ft. high in 1 minute, and this expressed in animal power is equal to the work done by two horses weighing 1,000 lb. each. Two such animals doing 10 hours' work per day would develop power at the rate of 1 H.P. mechanical. Thus we have a machine, costing at the most £50, and practically no annual expense, having the same power as a couple of animals costing in the first place at least £30 apiece and demanding not only an annual expenditure for food and attendance, but an allowance for depreciation and risk. Further consideration, of course, reminds one that animal power possesses many valuable features which are absent from such a machine as a windmill; but assuming that the horse were required like the windmill for, say, pumping alone (by tread or sweep power), it is obvious for many reasons that wind is by far the more economical power to employ.

Comparison of wind power with human labour leads to similar conclusions. It requires nearly 10 men to exert continuously in a normal day's work power equal to 1 H.P. A 12 ft. mill is capable of pumping at the rate of raising 3,300 gallons of water 1 ft. high in 1 minute, where a man, working at a pump, can only raise water at the rate of 300 gallons 1 ft. high per minute.

Nevertheless, where there is very little work of the windmill type to be done, say, not more than a few days each year, it would not be economical to expend capital on a windmill, even though per unit of power it be much cheaper than animal power. When to employ wind power can only be determined by a consideration of the conditions of each particular case.

DESCRIPTION OF DIAGRAMS.

FIG. I.—*Wheel head.* W, wheel; G, spring governor; V, vane; IS, internal spur; SP, spur pinion; CS, centre shaft.

FIG. II.—*Foot gear.* C, slip couplings; HS, horizontal shaft.

FIG. III.—*Pump gear.* CS, centre shaft; CG, crank gear; SP, spur pinion engaging internal spur; S, crank shaft which connects piston rod.

FIG. IV.—*Side view of tower.* SB, horizontal steel braces; CB, diagonal cable braces.

SWINE ERYSIPELAS.

This disease may be defined as a contagious disease of swine caused by the bacillus of Swine Erysipelas.

Prevalence.—The investigations which have been conducted in connection with swine fever have shown that swine erysipelas, particularly in its milder forms, frequently affects pigs in Great Britain, and that in a certain proportion of cases it is the cause of death.

During the last three years records have been kept by the Veterinary Officers of the Board regarding outbreaks of disease which were reported as suspected swine fever and afterwards found by the visiting veterinary surgeon to be swine erysipelas. These records, which extend to 1,200 such outbreaks annually, show that at least one pig died in each case.

This figure, however, cannot be taken as nearly representing the annual number of outbreaks of swine erysipelas, because in most cases the disease assumes a mild form, and there must be many other outbreaks in which a pig has died without raising a suspicion of swine fever, in which case the fatality would not be reported to the Board. The disease is most frequently met with in fat pigs, that is to say, at a somewhat later age than that at which they are most usually attacked by swine fever.

Acute Cases.—In acute cases of swine erysipelas the animals show the usual signs of severe illness in the pig, viz., rise of temperature, shivering, loss of appetite, and vomiting. In such cases a fatal termination may take place in 24 to 48 hours, but the animals frequently live much longer. In the less acute cases a red patchy eruption, from which the disease gets its name—erysipelas—appears on the buttocks, thighs, body, and ears.

The breathing is very rapid, and the swine stagger about when made to walk. Ultimately they lie prostrate in the litter and die comatosed.

Mild Cases.—In mild cases the general symptoms are not marked; the swine appear to be out of sorts, and show the usual skin eruption, which is sometimes called nettle rash.

Animals which have apparently passed through the acute stages of the disease may remain unthrifty for a long time.

Sometimes they die suddenly from disease of the heart, which is not an uncommon sequel of the disease. In other cases they present symptoms of lameness due to trouble in the joints.

The skin is discoloured by livid patches as in swine fever, but sometimes the only symptoms shown are those of nettle rash. The bacillus apparently can flourish for a long time outside the bodies of animals, so that once the disease is introduced into insanitary styes the infection tends to remain there. For some reason, however, which is ill understood, the disease may assume a very mild form for a time, then burst out acutely. In Great Britain the acute forms have been observed particularly in the warm months.

Post-mortem.—The membranes of the stomach and intestines show red patches, and are often swollen. The intestinal glands on the membrane are red and enlarged; sometimes the surface over these glands is abraded, but the distinct ulcer of swine fever is never seen. The lymphatic glands throughout the body are swollen and red. The spleen is often enlarged.

The membranous coverings of the lungs and heart show red spots, and sometimes water is present in the chest and heart sac.

The lungs are congested.

In the chronic form the tissues around the opening between the chambers of the heart, particularly on the left side, are frequently thickened and rough; that is to say, endocarditis is present.

Prevention and Remedies.—This is a disease against which several methods of protective inoculation have been directed. At the present day it is customary to employ either (1) a preventive serum obtained from horses which have been highly immunised by the injection of large quantities of pure cultures of the bacillus of swine erysipelas, or (2) a combination of specified doses of preventive serum and pure cultures of the bacillus.

The immunity conferred by the serum alone begins immediately, but it lasts for little more than ten days. Apparently, however, it exerts a protective action even when used in the initial stages of infection. The immunity conferred

by inoculating with both serum and pure culture lasts a much longer time, probably six months and even longer. Leclainche, who has been foremost in elaborating this method of protective inoculation, advises that where the disease has already broken out the pigs should receive a preliminary injection of serum, 10 to 20 c.c. according to weight. This, he states, greatly reduces the number of accidents consecutive to vaccination proper, that is to say, with the combination of pure culture and serum which is performed about ten days afterwards. The vaccination proper consists of two operations. The first is performed with a mixture (made on the spot) of serum—1 c.c. per 20 lb. live weight, with a minimum dose of 5 c.c. and a maximum of 10 c.c.—and 0.8 c.c. of a pure culture. Twelve days later the second operation is performed, when the animal receives 0.8 c.c. of a pure culture without any serum. The materials are injected subcutaneously, either at the base of the ears or inside the thighs. During a period of 18 months ending November, 1901, Leclainche had under observation 24,000 pigs which had been inoculated by his method; about one-half of these were treated by a preliminary injection of serum alone. Not a single accident was recorded.

Lorenz has reported observations on 22,161 pigs which were inoculated in Eastern Prussia by the combined method (serum and culture), and 3,831 of these pigs were on farms on which the disease had already broken out. In the latter there were no fresh cases of swine erysipelas after inoculation; 50 per cent. of recoveries were recorded in sick animals after the injection of serum alone (1-4 doses). Nettle rash, which is a mild form of swine erysipelas, occurred in 0.04 per cent. of the inoculated animals. The disease disappeared from the farms after inoculation was adopted, whereas it had appeared at regular intervals before that time.

Recommendations.—1. It is not advisable to resort to inoculation of pigs on non-infected premises unless the circumstances are such that owing to the proximity of acute outbreaks it appears practically impossible to prevent the disease being introduced by methods of rigorous isolation, because the operation might possibly be the means of infecting the premises.

2. Should the disease appear, however, all the pigs should, with the least possible delay, receive a dose of serum, and those in which the temperature is normal should be removed to non-infected styes on the same premises, if this be practicable. Ten days afterwards the vaccination proper may be practised after the method of Leclainche (serum and virus, then virus alone) on those animals still showing a normal temperature. The pigs with high temperatures should be returned to the infected styes, and if their value warrants it they should be treated by injections of serum alone. On no account should they receive the culture. If it be found impossible to separate the sick from the healthy the operations should be carried on in the infected styes.

3. Although this disease can to a large extent be successfully combated by inoculation, it must not be thought that measures of isolation and sanitation can be dispensed with. While the outbreak lasts no new pigs should be brought in, and none should leave the premises except for slaughter under the most rigorous precautions against the disease being conveyed to other premises. If a pig owner finds that the disease reappears annually on his premises he should resort annually to preventive inoculation, timing the operation so as to have his animals immunised before the season of greatest activity. He should also remember that the complete eradication of the disease from his premises will be greatly facilitated by keeping his pigs in styes which can be properly disinfected.

Although swine erysipelas can hardly be regarded as a very fatal disease of pigs, in Great Britain at least, the Board have been informed that it often interferes materially with the marketing of pigs, since it frequently attacks them and causes considerable emaciation close to the time when they are expected to be ready for market. In such cases owners have been advised to immunise their pigs by methods of inoculation about three months before they are expecting them to be ready for market. From information received from those who have put this advice into practice, it would appear that the adoption of preventive inoculation has given excellent results.

As swine erysipelas is not a disease notification of which

is required by Order of the Board, it should be borne in mind that a pig suffering from that disease may also be affected with swine fever, and that the Swine Fever Order of 1908 requires that every person having in his possession or under his charge, a pig affected with, or suspected of swine fever, shall give notice to the police. In this connection attention is called to the "Notice to Pig Owners" issued by the Board.

THE COLORADO BEETLE.

This beetle (*Leptinotarsa (Doryphora) decemlineata*, Say.), a member of the family *Chrysomelidæ*, was first known in the west of the United States, and has now spread over the United States and Canada. In its native home in Colorado it was known to feed on wild plants of the natural order *Solanaceæ*, but about 1850, having found its way to the cultivated plants of settlers in the West, it began to travel eastwards. By 1859 it had reached Nebraska, and by 1865 it had crossed the Mississippi. It had passed north into Ontario by 1870, and in 1874 it had reached the Atlantic. Later it obtained a partial footing in England and the Continent of Europe, but prompt preventive and remedial measures removed the danger.

Food Plants.—Solanaceous plants, chiefly those of the genus *Solanum*, are the favourite food plants of the Colorado Beetle. *Solanum rostratum* and *Solanum cornutum* are the two wild species upon which the beetle was first noticed feeding. In preference to these and to other wild species of *Solanum*, the beetle chooses the cultivated potato. The tomato (*Lycopersicum*) is also attacked. The following other Solanaceous plants have been used as food plants:—Thorn-apple (*Datura*), henbane (*Hyoscyamus*), tobacco (*Nicotiana*), apple of Peru (*Nicandra*), winter cherry (*Physalis*), belladonna (*Atropa*), and *Petunia*.

Plants outside the order *Solanaceæ* on which the insects have been found feeding are:—Various poppies, especially the Mexican or prickly poppy (*Argemone Mexicana*), pigweed (*Amaranthus retroflexus*), hedge mustard (*Sisymbrium officinale*), oats, smart-weed (*Polygonum Hydropiper*), red

to two feet or more, though eight to ten inches is the average. Exceptionally the beetles pass the winter among rubbish.

Genial weather in spring brings the beetles from their winter quarters. The beetles fly well and readily, especially during the warmer parts of the day. "In flight the striped elytra (wingcases) are raised and held motionless from the thorax, while the gauzy wings, unfolded and vibrating, strike pleasantly on the eye as the sun intensifies their rosy hues."*

The females lay their eggs in clusters of nine to forty or more on the under surface of the leaves, attaching them by one end. The eggs may hatch in less than a week, or they make take over a week, according to the conditions. Chittenden says that the larvæ take from sixteen days to three weeks to attain maturity. When full-fed the larva leaves the plant and passes into the soil, where pupation takes place in a cell. The pupation stage in the most favourable conditions may be over in a week. Thus, where the environment is very favourable, the whole life-cycle can be completed in a month. From some parts of the United States two generations are recorded as occurring in a year, and from other parts three generations. When the weather begins to turn cold in the autumn, the beetles bury themselves in the earth for hibernation.

Natural Enemies.—A great number of natural enemies tend to check the Colorado beetle in America. Among these are birds which feed upon both larvæ and adults, especially the rose-breasted grosbeak (*Guiraca ludoviciana*). Both ducks and chickens, but especially the former, devour the larvæ. In America the toad (*Bufo Americana*) gorges itself with the grubs, and our British species would probably also greedily devour them.

The insect enemies recorded by Riley are very numerous. They are chiefly predatory beetles and blood-sucking bugs or *Hemiptera-heteroptera*. Strange to say, no members of the *Hymenoptera*, the order that contains so many parasites, are actually parasitic on the Colorado beetle; a single species of wasp (*Polistes rubiginosus*), however, occasionally provisions its nest with the larvæ. A *Tachinid* fly is parasitic on the grubs.

* Girault and Rosenfeld, quoted by Chittenden

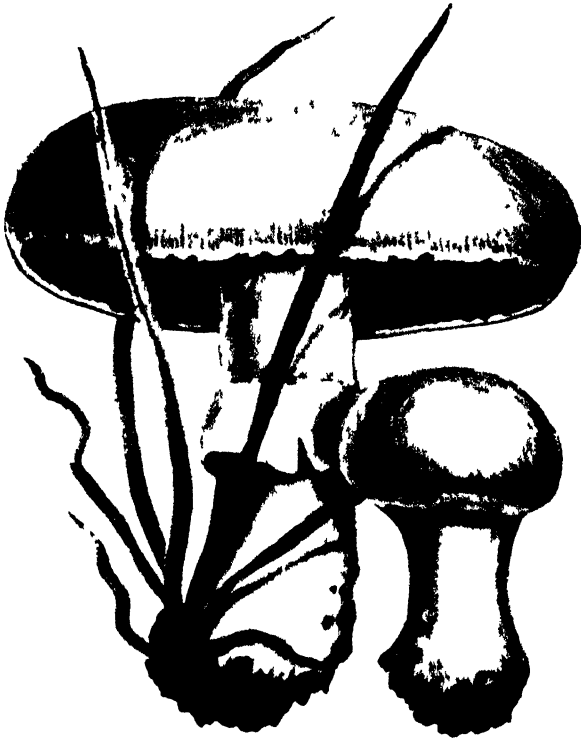


FIG. 1.—COMMON MUSHROOM
(*Agaricus campestris*)

Theobald, when examining the allotments at Tilbury, noticed the large Seven-spotted Lady-bird (*Coccinella septempunctata*) in considerable numbers both in the adult and larval stages. The larvæ were seen in one instance devouring the eggs of the Colorado beetle, and when placed in a box with some ate them ravenously. Thus in the short space of time in which this potato pest existed in this country it found one natural enemy, which, on account of its ravenous nature, would materially check its increase. A single female Colorado beetle, however, is said to be capable of producing from 500 to 1,000 eggs.

Treatment.—In America an infestation is controlled by jarring the beetles off the plants into vessels containing paraffin. This method is very useful, as a large number of beetles are frequently to be found feeding together on the same plant. The pest is chiefly combated, however, by the use of arsenical sprays, arsenate of lead and Paris green both proving very effective.

The pest has appeared from time to time in Great Britain, but has always been exterminated. It was made the subject of legislation in 1877 by the Destructive Insects Act, and is included among the insects scheduled under the Destructive Insects and Pests Order of 1908. This Order requires the occupier of any premises on which the insect is discovered to notify the fact to the Board with particulars of the time and place of discovery, under a penalty not exceeding ten pounds. It also renders it illegal to sell or expose or offer for sale, without the written permission of the Board, any live specimen of the Colorado Beetle. Copies of the Order may be obtained on application.

EDIBLE AND POISONOUS FUNGI.

Contrary to popular belief, the poisonous kinds of fungi are comparatively few in number, while there are on the other hand some fifty species of fungi which may quite safely be eaten. In order to recognise with certainty these different kinds, it is necessary, however, to know the special features possessed by each species which separate it from all others. The rule-of-thumb signs for discriminating between edible

and poisonous fungi are absolutely valueless, and no reliance should be placed on the presence of a skin that is readily peeled off as an indication of an edible fungus, or on the statements that a silver spoon placed in contact with poisonous kinds becomes tarnished, or that all fungi growing on wood are poisonous.

With a view to enable residents in the country to distinguish accurately between poisonous and edible kinds, and thus to utilise to a greater extent those varieties useful as food, the Board have decided to publish from month to month in this *Journal* illustrations of certain species which are more or less commonly found in Great Britain, with brief descriptions to assist identification.

The original drawings of these illustrations were prepared by Mr. George Massee, Assistant Keeper at the Royal Botanic Gardens, Kew, with the assistance of Miss Ivy Massee.

COMMON MUSHROOM, *Agaricus campestris* (Fig. 1).

This mushroom is nearly globose when young and in the "button" stage. It gradually expands until nearly flat, when it is white in colour and 3 to 6 inches across. The flesh is thick and white, changing to dirty brown when cut or broken; gills crowded and rosy, then dark brown, and watery and deliquescent when old; stem stout, white, with a ring or frill near the top.

It is found in pastures in summer and autumn.

It often appears in enormous quantities in potato fields, &c. The mushroom commonly cultivated in this country is by some considered as a variety of the common field mushroom, differing from it in having the cap more or less covered with brown scales. In the cultivated form the aroma is not so pronounced as in the wild plant.

HORSE MUSHROOM, *Agaricus arvensis* (Fig. 2).

The cap of this mushroom is ball-shaped when young, gradually expanding until almost flat, white in colour, but changing to primrose-yellow when bruised, 4 to 6 inches across, but sometimes much larger; flesh white, not becoming brown when broken; gills brown, remaining dry when old; stem stout, white, with a broad frill.



FIG. 2. —HORSE MUSHROOM
(*Clavaria arvensis*)

It is found in summer and autumn in pastures and under scattered trees, where it sometimes forms large fairy-rings.

It differs from the common mushroom in the flesh not turning brown when broken, and in the gills remaining dry when old. There is a prejudice against this mushroom in many districts, but it is quite safe to eat, and is preferred by some to the common mushroom. Many tons are sold in London, and purchased presumably under the impression that it is the common mushroom.

TUFTED MUSHROOM, *Agaricus elvensis* (Fig. 3).

This mushroom grows in tufts or clusters. The cap is hemispherical at maturity, the entire surface being broken up into large brown scales on a whitish ground, margin warted, 4 to 6 inches across; gills broad, brownish flesh-colour, remaining dry; stem 4 to 6 inches high, stout, more or less swollen at the middle, bearing a large ring that is warted on the under side. The flesh of the cap is about three-quarters of an inch thick, and turns reddish-brown when cut.

This may be recognised amongst the true mushrooms by its tufted habit of growth.

It is found on the ground under the drip of trees, more especially under oak.

The flavour is excellent, and is considered to be superior to that of the common mushroom. An attempt might, with advantage, be made to cultivate this species.

Small Red Ant.—During recent months several complaints have been received by the Board respecting the presence of small red ants (*Monomorium pharaonis*)

**Notes on Insect and
Fungus Pests.**

in houses. These creatures are very troublesome when once they have gained a footing in a house, and are extremely difficult to exterminate. They may, however, be trapped by means of pieces of sweet or greasy substances, such as sponge-cake, lard, liver, ham-bone, or meat; which should be left exposed where the ants can easily reach them, while all other kinds of food should be carefully covered up. The insects, which will swarm over these traps, can either be burnt with a taper, or the trap can be dropped into boiling water or paraffin, or put in the fire. The traps must be

regularly set and regularly visited, though when the pest is well established this will prove very tedious. The ants that forage for food are the workers of the colony, and when they are destroyed the young will not be fed, and would eventually perish; the queen, however, continues to lay great numbers of eggs, from which, through larval and pupal stages, new workers continue to be produced. It is advisable, therefore, to search for the nest, which may be below flooring, or in walls, or in the neighbourhood of a boiler or heating apparatus. If the nest can be reached, boiling water should be poured over it; or an ounce of bisulphide of carbon may be poured into it. The hole should at once be covered over. As the bisulphide fumes are very poisonous to breathe and are highly inflammable, this substance should only be used exceptionally and with the utmost caution. All fires and lights must be extinguished before it is used. The cases reported to the Board occurred in Aberdeenshire.

House Beetle.—A report was also received from Huddersfield of a beetle which had recently appeared in the basement of a new house, and which had become a nuisance. On investigation, it proved to be *Quedius mesomelinus*, one of the Staphylinidæ, a species widely distributed in Great Britain, and found in the open on rubbish heaps and the refuse of hay stacks, as well as in cellars. The beetles are found in damp places, and as both they and their larvæ are predaceous and carnivorous, they could probably be trapped by baits of meat.

The Flour Mite.—Another pest that was found to be present in a building was the mite *Aleurobius farinæ*, a most common and world-wide trouble. The mites are known to infest museums, where they destroy the specimens, and to live on all kinds of grain and hay, flour, cheese or hides. In the case reported to the Board, the pest was found in Cheshire in the premises of a manufacturer of feeding stuffs, who made several observations on the creature. He found that it fed on wheat, barley and oats, but would not attack beans, or maize except in a fermented state. He also stated that the mites had a strong "minty" odour, which rendered the feeding stuffs in which they swarmed objectionable. This odour was said to be given off rapidly on the application of heat, say



FIG. 3.—TUFTED MUSHROOM

(*Agaricus eleensis*).

100 degrees Fahr. Fumigation with sulphur is recommended as the best remedy, but persistent treatment is necessary to get rid of the pest entirely. (See also *Journal*, Mar. 1909, p. 925).

An Uncommon Insect.—A correspondent from Southsea forwarded an insect, which was identified as *Pachylomma buccata* Bres, one of the *Braconidæ*, a family of insects related to the Ichneumons, in the order Hymenoptera. This Braconid is rarely met with in this country, though found in numbers elsewhere. It is believed to be parasitic upon ants.

The Hay Mite.—Another pest, more commonly associated with indoor life, and to be found occasionally on cheeses, namely the mite *Tyroglyphus longior*, was reported from the neighbourhood of Great Yarmouth. In this instance, it was found "in millions" round a hayrick. In its young stage the mite is furnished with six legs only, but in the adult stage it has the eight legs characteristic of mites. These creatures feed on dry vegetable or animal material, but they are of small economic importance, since they do not injure the hay and do no harm to the stock that feed on it. The most that has been complained of is that the beasts may cough a little owing to the tickling sensation caused by the crowds of mites. Haymakers and others, may, however, be irritated. The mites can be killed by pouring hot water over the heaps round the hayricks. (See also *Journal*, Dec. 1908, p. 688.)

During the autumn of 1909 the Board were engaged on an enquiry into the distribution of wart disease of potatoes in Great Britain. Five Inspectors were instructed to visit suspected districts, and to urge potato growers to report cases of disease. A large number of letters were received from occupiers and others reporting the presence of wart disease (black scab)

**Distribution of
Wart Disease
of Potatoes in
Great Britain.**

From an examination of all the available information it would appear that wart disease is almost entirely confined to an area including Lancashire (south of the Ribble), Cheshire, Shropshire (north of Shrewsbury), Staffordshire, and those parishes in Warwickshire and Worcestershire which immediately adjoin Birmingham. Within this area most parishes contain one or more allotments or gardens in which diseased

potatoes were found, though in only a few cases were the field crops affected. Wart disease has also spread beyond this area in patches among the parishes that lie round it. Thus, a few cases have appeared in Warwickshire as far south as Kenilworth and as far east as Rugby; two parishes in Leicestershire are affected; a few cases occur in Derbyshire and West Nottinghamshire in the neighbourhood of Mansfield; and a few parishes in the West Riding of Yorkshire, on the borders of Derbyshire and Cheshire, have been attacked. Westwards of the affected area the disease has spread in patches into Wales, appearing in the Counties of Brecon, Cardigan, Carmarthen, Carnarvon, Denbigh, Flint, Glamorgan, and Merioneth.

The Board's Inspectors have examined a large number of parishes in Gloucester, Warwick, Leicester, Nottingham, Lincoln, and the West Riding of York, adjoining the infected area, without finding any trace of the disease.

Wart disease has also spread northward beyond the infected area in patches. Cases have been found in Lancashire (north of the Ribble), in Cumberland, east Dumfriesshire, in north-west Ayrshire, and in two small areas, one including Clackmannan, south-west Perth, east Stirling, and south-west Fife, and the other, central Fife and Kinross. It appeared also in the neighbourhood of Edinburgh. In nearly every case the disease is confined to allotments and gardens and the field crops are untouched.

An examination of the map of Great Britain shows that outside the affected area and the isolated patches there are large and important districts under potatoes where the disease is unknown. Growers outside the area would be well advised to procure their seed from unaffected districts, but those inside can with safety buy potatoes locally or from other parts of the area, provided that they ascertain that the potatoes were grown on a farm where the disease does not exist.

Great care must be taken not to apply manure made from diseased potatoes to arable land. If the manure is contaminated disease will appear, no matter how carefully seed may be chosen. It is probable that disease introduced into the soil by manure may infect potatoes planted several years after the manure has been applied.

The Board have received the following note on the dressing of seeds from Mr. W. E. Sawyer. The use of tar for this purpose is well known, and has been found satisfactory.

**Dressing for Spring
or Winter Wheat.**

Owing to the difficulty on some heavy clay lands of getting the full acreage of winter wheat sown, and to the high prices at present ruling for wheat, no doubt there will be a large acreage of spring wheat sown. The new French wheats seem likely to be useful for this purpose on account of their early ripening qualities. To preserve the seeds from rooks, which in the early spring are apt to be troublesome, a good way is, after the usual anti-smut dressing of blue vitriol, to dress the wheat as follows: Thin down with paraffin a pint of coal tar to make it work easily. This will be sufficient to dress six bushels of wheat, which should be spread on the barn floor and sprinkled with the mixture, turning the seeds five or six times until they are all uniformly black. Then sprinkle powdered lime over them and turn again until they are coated with the lime; this is necessary to prevent the wheat from sticking together or blocking up the drill. This and the anti-smut dressing increase the bulk of the ends somewhat, and must be allowed for in setting the drill for the quantity of seed to be drilled per acre. The seed retains the coat of tar, but the dressing in no way affects the germination.

Information was given in this *Journal* in October, 1908, as to the experimental cultivation of tobacco in Ireland, and also as regards the Tobacco Growing (Scotland) Act, 1908. Since that date the Department of Agriculture for Ireland has issued in its own *Journal* (January, 1909) an exhaustive review of the experiments and of the information obtained up to the end of 1908. A number of leaflets are also being issued on "Tobacco Growing in Ireland," as follows: (a) Introductory; (b) Suitable Soils and their Treatment; (c) Curing Barns; (d) Suitable Varieties; (e) Seed Beds; (f) Manures; (g) Transplanting; (h) Cultivation; (i) Harvesting and Curing; (j) Grading, Packing, and Maturing; (k) Marketing. As the question of the possibility

of growing tobacco in England has attracted some attention, the following extracts from the introductory leaflet mentioned above may be of interest. Tobacco growing in England is, however, still illegal without the permission of the Treasury.

The first series of small experiments in the growing of tobacco which was carried out in Ireland previous to the year 1904 did not prove conclusively what type of tobacco was best suited to Irish conditions, nor what methods of culture were necessary. Further experiments have accordingly been undertaken with a view to solving these problems.

The second series was commenced in the year 1904, and has been conducted on a commercial scale in order to determine the possibilities of tobacco as a paying crop. The area under tobacco has been gradually increased from 20 to 100 statute acres and the number of growers from 1 to 23, residing in seven counties.

Tobacco is grown the world over, but, being extremely sensitive to every influence, the product of each region has its own peculiar characteristics. The trade recognises this by dividing cured tobaccos into classes, according to their use; into types, according to their origin or peculiar character; and into grades according to quality. Thus, there are tobaccos of the cigarette class derived from Turkish and Virginia types, which may be divided into numerous grades. On the other hand, tobacco of the Burley type may comprise several classes—as chewing, pipe cutters, roll wrappers, and cigarette cutters. Obviously, therefore, the first aim was to determine the class and type of tobacco best adapted to Irish conditions, having regard to soil, climate, and the economic conditions of production and sale. This has been too complex to determine in the few seasons that have elapsed, so that tobacco growing in Ireland is yet in a distinctly experimental stage.

Before tobacco can be regarded as a commercial crop by the Irish farmer, the following conditions must be fulfilled :

1. Probably one class and one type of tobacco distinctly suited to the country must be found.
2. The requirements of the class and type selected must be clearly understood, and a system of production evolved to suit the peculiar conditions.

3. A reliable market and a fair profit must be assured.

These are the points which the experimental growers are trying to ascertain under the guidance of the Department of Agriculture.

As regards the first point, the following table shows the present stage of the experiments :

CLASSES and TYPES of TOBACCO Recommended for Further Trial.

Class.	Type.	Remarks.
1. Roll and Plug... ..	Virginia Pryors .	In greatest demand. The most easily grown and sold.
2. Brown Roll Wrapper...	Kentucky Burleys ...	A limited demand. Requires more care to produce the standard quality.
3. Bright Cutter	do.	do.
4. Cigarette	Turkish (varieties)	Large demand. Very tedious to produce. Requires a standard of quality very difficult to produce in Ireland.
	Viiginia Pryors .	Large demand. Adapted to light soils and dry climates ; therefore very difficult to produce in Ireland.
	Kentucky Burleys .	Market undeveloped. A new tobacco peculiarly suited to Irish conditions.
5. Ciga1 Wrapper	Sumatra .	Limited demand in United Kingdom Most expensive to produce, requiring great care and skill. Standard of quality very high, but in many respects is adapted to Irish conditions.

In each case either the class or type offers certain advantages which render it inadvisable to discard it until the relative cost of production and market value have been more definitely determined by methods of culture best suited to the new environment.

Considerable progress has already been made in lowering the cost of production. Sufficient quantities of Classes 1, 2, and 3 have been sold to test their market value fairly, but the quantities of Classes 4 and 5 have been too small for this purpose, though some idea of their value has been obtained.

The following is the estimated average cost of production

per statute acre of the types on trial. In addition, the estimated average maximum yield per acre and the consequent cost per pound are given, along with the average selling price per pound. The market values of Irish-grown Turkish and Sumatra tobaccos have not been sufficiently ascertained, but what is considered a fair estimate is here given.

ESTIMATED COST OF PRODUCTION per STATUTE ACRE, based on RESULTS hitherto obtained in Ireland.

	CLASS.				
	Plug and Roll	Roll Wrapper and Bright Cutter.	Cigarette	Cigar Wrapper.	Cigarette.
	TYPE.				
	Pryor.	Burley.	Burley.	Sumatra.	Turkish.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Seed Beds	1 10 0	2 0 0	2 0 0	3 0 0	8 0 0
Farmyard Manure ...	3 15 0	3 15 0	3 15 0	3 15 0	2 10 0
Spreading Manure ...	1 5 0	1 5 0	1 5 0	1 5 0	1 17 6
Preparation of Land ...	2 0 0	2 0 0	2 0 0	2 3 0	1 15 0
Artificial Manure ...	2 10 0	2 10 0	2 10 0	2 10 0	—
Planting	0 15 0	0 16 0	0 16 0	1 10 0	4 0 0
Cultivation	1 8 0	1 8 0	1 8 0	2 2 0	3 10 0
Suckering and Topping	0 10 0	0 10 0	0 10 0	0 5 0	1 0 0
Harvesting	1 16 0	2 5 0	8 0 0	15 0 0	25 0 0
Curing	3 3 0	4 0 0	6 0 0	2 0 0	1 7 6
Grading	2 0 0	3 0 0	3 0 0	6 0 0	2 0 0
Packing	0 16 0	1 2 0	1 2 0	1 0 0	2 0 0
Maturing	0 12 0	0 12 0	1 0 0	2 10 0	1 0 0
Marketing	2 10 0	2 10 0	2 10 0	2 10 0	2 10 0
Rent and Taxes ...	1 10 0	1 10 0	1 10 0	1 10 0	1 10 0
Interest—Depreciation..	3 0 0	3 7 0	6 0 0	3 0 0	2 0 0
Total Cost	29 0 0	32 10 0	43 6 0	50 0 0	60 0 0
Estimated Maximum yield under average condition	1,160 lb.	1,300 lb.	1,660 lb.	1,000 lb.	1,440 lb.
Average Cost per lb. ...	6d.	6d.	6½d.	1s.	10d.
Average Selling Price per lb.	4d.	6d.	7d.	1s.	10d.

The figure assigned for interest and depreciation relates to the curing equipment only, which consists mainly of the curing barn, the cost of which may vary extremely. Elaborate steam-heated barns may cost over £100 per acre of capacity, while disused stone structures may be easily con-

verted and heated by braziers or open fires of hardwood at very small cost. The above charges are for the simplest barns adapted to the peculiar requirements of each tobacco, the cigarette Burley alone requiring steam heat.

Tobacco, like most farm crops, yields little more than a fair return upon the labour and capital involved in its production, though in highly-protected countries, or where labour and virgin soils are very cheap, tobacco growing may produce large net profits. The importance of tobacco as a farm crop is due to the facts that it employs a large amount of labour; that, when properly packed, it is non-perishable; and that it may be cheaply transported to distant markets.

The fourth part of the Agricultural Statistics for 1908, published by the Board of Agriculture and Fisheries [Cd. 4,989. Price 6½d.], contains the

International statistics of the crops and live stock in
Agricultural Statistics. the British Empire and in foreign countries, and returns of Colonial and foreign prices of agricultural produce. The tabular matter is prefaced by a report by Mr. Rew, dealing with some of the figures in their international aspect.

In referring to the wheat area of the world, Mr. Rew observes that statistics of wheat supply still retain pre-eminence in all discussions of the world's production. Their interest to the statistician and economist—as well as ultimately to a large proportion of the inhabitants of the earth—lies in the theoretical uncertainty of the wheat crop and the appalling consequences of its possible failure. The exhaustion of a mineral product may be contemplated—as Jevons contemplated the possible exhaustion of coal supplies—but it can only be conceived as a gradual process during which the world would have some chance of providing for the new conditions, however alarming they might be. But the consequences involved in a failure for one year of the world's wheat-crop are beyond calculation. For this reason the figures relating to wheat supplies have a perennial interest which attaches to no other set of statistics, and for this reason also they have received special attention, and are on

the whole more complete than any others relating to agricultural production.

From a calculation based on the information available in 1908, it appears that the wheat area of the world cannot now fall far short of 240,000,000 acres. Of this vast area it would seem, so far as the figures permit comparison, and making some allowances for a probable progress in the direction of greater comprehensiveness and more complete accuracy in the collection of returns, that about 45,000,000 acres have been added within the past fifteen years.

An estimate of the increase of the wheat-eating population of the world is practically impossible, and consequently the relation of increased supply to increased demand cannot be expressed statistically. The course of the world's price, allowing for seasonal disturbances, would no doubt be the best index of any pressure of population on the means of subsistence, whether as regards wheat or any other product, but so far as figures are available they suggest that at the present time the total area under wheat is quite sufficient, with a normal harvest, to supply the demand.

Mr. Rew also discusses the changes which have taken place since 1878 in the number of cattle, sheep and pigs in Europe, the British Colonies and in other countries.

As regards horses a survey over the same period shows that there has been a substantial addition to the stock of horses in those countries for which figures are available. In Europe the number of horses appears to have increased in the 30 years from about 35 to 41 millions, while some 2 millions seem to have been added in the British Colonies and upwards of 12 millions in Argentina and the United States.

The Board of Agriculture and Fisheries have had their attention drawn to the unnecessary cruelty to animals, which arises through the improper and indiscriminate use of traps and snares. Any carelessness in trapping which may lead to suffering in the animals caught deserves severe censure, and the Board think that if the provisions in existing Acts of Parliament

**Prevention of Cruelty
in the Destruction
of Animals.**

were more generally known and more strictly enforced, a considerable amount of suffering might be prevented.

Ground Game Act, 1880.—The effect of the provisions of the Ground Game Act, 1880, which give occupiers a right to kill hares and rabbits on their lands, is to limit the right to the occupier and persons authorised by him in writing.

It is therefore possible for farmers to assist in the prevention of cruelty by exercising discretion in authorising persons to trap hares and rabbits, and by seeing that such persons properly attend to the traps which they set, so that animals are not allowed to remain in the traps for any long period. The Board believe that much good could be done in this way.

Section 6 of the Act provides that no person having a right of killing ground game under the Act or otherwise shall use any firearms for the purpose of killing ground game between the expiration of the first hour after sunset and the commencement of the last hour before sunrise; and that no such person shall, for the purpose of killing ground game, employ spring traps except in rabbit-holes, or employ poison; and any person acting in contravention of this section is, on summary conviction, liable to a penalty not exceeding two pounds.

It will be seen that the Act expressly prohibits the setting of spring traps in the open for the purpose of taking hares and rabbits. If a spring trap is employed at all it must be set actually in the rabbit-hole, and it has been held in a Scotch case that "rabbit-hole" does not include the run at the mouth of the hole, but is confined to "that part of the burrow which is inside the ground and covered by the roof" (*Brown v. Thompson, 1882, 9 Rettie Court of Session Cases, 1183*).

The spring trap, however, is in any case an exceedingly unsatisfactory and undesirable means of catching ground game, and, in the Board's opinion, should not be used.

A humane rabbit trap can be made by a simple adaptation of the ordinary "wire" trap or snare. In the ordinary trap of this type strangulation takes place, but it seldom occurs immediately, and the animal may continue to struggle for a considerable period. If a very small ring be tied to the wire

by a simple knot so as to leave $5\frac{1}{2}$ inches between it and the small loop through which the wire is passed to form the snare, it will prevent the wire being pulled up too tightly. A loop about $1\frac{3}{4}$ inches in diameter will thus be left round the neck of the trapped rabbit, which will be secured without being strangled. This trap has the further advantage that the rabbits are in a better condition for purposes of sale.

The Wild Animals in Captivity Protection Act, 1900.—This Act, which applies to all wild birds and beasts, provides that a person shall be guilty of an offence who, whilst an animal is in captivity or close confinement, or is maimed, pinioned, or subjected to any appliance or contrivance for the purpose of hindering or preventing its escape from such captivity or confinement, shall by wantonly or unreasonably doing or omitting any act cause or permit to be caused any unnecessary suffering to the animal. The Act does not apply to any act done or to any omission in the course of destroying or preparing any animal for destruction as food for mankind.

Wild Birds Protection Acts.—The use of pole-traps is prohibited by the Wild Birds Protection Act, 1904, section 1 of which enacts that every person who, on any pole, tree, or cairn of stones of earth, shall affix, place, or set any spring, trap, gin, or other similar instrument calculated to cause bodily injury to any wild bird coming in contact therewith, and every person who shall knowingly permit or suffer or cause any such trap to be so affixed, placed, or set, shall be guilty of an offence, and shall be liable on summary conviction to a penalty not exceeding forty shillings, and for a second or subsequent offence to a penalty not exceeding five pounds.

The use of hooks or other similar instruments for taking wild birds is an offence under the Wild Birds Protection Act, 1908.

The trapping of wild animals in general has not been made the subject of legislation, but the desirability of employing a type of trap calculated either to cause immediate death or to secure the animal without injury is obvious, and the Board trust that all lovers of animals will do their utmost to prevent the use of cruel traps.

Prohibition of the Use of Poison.—The laying of poisoned grain or seed on any ground or other exposed place or situation is prohibited by the Poisoned Grain Act of 1863, subject to a saving clause permitting the sowing of dressed grain and seed. Under the Poisoned Flesh Prohibition Act, 1864, it is an offence to lay poisoned flesh or meat on land, but the Act allows the occupier of a dwelling-house or other building to lay it in the house or building or in an enclosed garden, or in drains connected with the house, or attached to the house if properly protected, and the owner of a rick or stack may insert in it any poisonous ingredient or preparation for the destruction of rats, mice, or other small vermin.

Assistance by the Public in enforcing Acts.—The enforcing of these Acts would be facilitated if persons who see any infringement of their provisions would immediately communicate with the Police or an Inspector of the Royal Society for the Prevention of Cruelty to Animals.

SUMMARY OF AGRICULTURAL EXPERIMENTS *

WEEDS, INSECTS, AND FUNGI.

Dodder Seeds in Seed Mixtures.—(*Journal of Roy. Agric. Soc.*, vol. 69, 1908).—Experiments have been carried out by the Society's Consulting Botanist, to ascertain the danger from dodder seeds present in clover or in ready-made seed mixtures for laying down pastures. Dodder seeds of the two kinds—the larger foreign and the native—were sown with various seeds used in agriculture—red clover, white clover, alsike, trefoil, lucerne, timothy, rye grass, cocksfoot, rape, and kale. Both kinds of dodder attached themselves to these very different plants, and the various clovers were more or less rapidly destroyed; little damage was done to the cruciferous plants like rape and kale, and practically none to the grasses. The dodder grew, flowered, and produced seeds on the clovers, while the other plants only provided food for the parasite for a time. The grasses suffered least from the attack, but they supported the dodder plants from twenty-one to thirty-four days in a condition vigorous enough to enable them to spread to the

* The summaries of Agricultural Experiments which have appeared in the present volume have been as follows:—Experiments with Cereals, April, p. 65, and May, p. 150; Experiments with Root Crops, June, p. 239, and July, p. 311; Experiments with Potatoes, July, p. 313, and August, p. 402; Miscellaneous Experiments, August, p. 405, and September, p. 489; Experiments with Clover and Grass, October, p. 589; Experiments with Live Stock, November, p. 660; Experiments with Milk, Butter, and Cheese, December, p. 753; and Weeds and Fungus Diseases, January, 1910, p. 854.

neighbouring plants. The presence of dodder seeds in seed used for leys is obviously dangerous, and the suggestion that seed containing dodder may safely be used in pasture is incorrect.

Thrips on Peas (*Jour. of Roy. Agric. Soc.*, vol. 69, 1908).—A number of cases of thrips on garden peas came under the observation of the Zoologist in 1908. The first seat of attack was not known, but after a number of dissections, the eggs were always found buried beneath the surface of the stamen sheaths. From there the larvæ emerge, and suck the sap of the adjacent pod. It is not known where the insect passes the winter, and preventive measures cannot, consequently, be adopted. Some treatment is, therefore, needed which will check the pest when it first begins to attack the peas. Various washes were tried on the already infested plants, but with very slight success. Paraffin emulsions did not reach any large proportion of the insects, which were too well hidden. Arsenic washes were hardly indicated in the case of sucking insects, but they were tried, with no very beneficial result. Distinct improvement, however, resulted from topping the plants, just as beans are topped when suffering from aphids. The topmost shoots seemed to be the main seat of the attack, and the pest was certainly mitigated by their removal. In some cases, badly infested plants so treated put forth a late crop of perfectly clean pods.

Leather Jackets (*Jour. Roy. Agric. Soc.*, vol. 69, 1908).—Experiments were undertaken (a) to determine if any treatment would kill the grubs without injuring the grass; (b) to see if by any means the grubs could be induced to come to the surface, so that they might be collected and killed. Carbon bisulphide vapour and solutions of formalin, ammonia, carbolic acid, toluene and other substances were tried, but none of them were found capable of destroying the grubs without greatly injuring the grass. Hydrocyanic acid vapour did not diffuse through the soil. Covering the ground at night, and copious waterings with insecticides with the object of bringing the grubs to the surface gave no consistent results.

The effect of the above substances on the grubs was tested in the laboratory, and showed that the grubs were remarkably difficult to kill, and that it is highly improbable that any substance will be found capable of destroying them in the ground without greatly injuring the grass.

The grubs frequently come to the surface, particularly in the early morning, and rolling at such times cannot fail to be useful. Steps should also be taken when the flies are about to emerge. The grubs come up to the surface to pupate, and constant rolling would be bound to kill a great number.

Spraying for Apple Sucker (*Worcester C.C. Reports*, by Kenneth G. Furley).—In the winter of 1906-7, a number of washes were tried on seven plantations in Worcestershire, against the eggs of the Apple Sucker, *Psylla mali*. The principal washes used were:—Lime and salt wash; strong paraffin emulsion; lime, sulphur, and caustic soda wash. In addition, six other washes were used, including medium and weak strengths of paraffin emulsion, Mr. Spencer U. Pickering's paraffin and soda wash, and a lime and paraffin wash. It was also thought advisable to try the ordinary caustic alkali wash, which was at one time thought to have an injurious effect on the eggs, in order

to settle once for all that in this respect it is useless, and consequently it is a waste of money to apply it. The double strength of caustic soda was used as well.

The spraying was done in October, November and March, in order to find which month was most suitable, should any of the washes prove successful. The only wash that was found to have any appreciable effect on the ova was the lime and salt wash. In 1907-8 this was again tried, and also Vi Fluid, a proprietary fluid advertised to destroy the eggs of apple sucker. The latter did not prove successful. The lime and salt wash was made according to the following formula:—Best selected white lime (freshly burnt) $1\frac{1}{2}$ cwt., agricultural salt 30 lb., water 100 gallons. The lime is first slaked and should be well stirred until all lumps disappear, when the salt is added. In order to prevent the coating flaking off the trees when dry, several "fixatives" were added to the wash. Of these waterglass at the rate of about 5 lb. per 100 gallons was the most effective, but also the most expensive. Powdered alum, 3-4 lb. per 100 gallons, and a few pounds of soft soap and of paraffin-soap jelly were also found to be more effective than most of the fixatives used. The lime and salt wash was again very efficacious in most cases, although in the first year of application the infestation was often only reduced. It was found necessary to apply it thickly, and the best results were obtained when spraying was done as late as possible up to the time when the buds began to burst.

Spraying against Apple Sucker (Journal of South-Eastern Agric. Coll., Wye. No. 17, 1908).—The life history of the Apple Sucker is given by Mr. Theobald, together with a description of various experiments and trials with the lime and salt wash. Experiments were carried out at Wye in 1907 and 1908 to find a cheap sticking medium to make the lime adhere more firmly to the bark, but no very satisfactory results were obtained.

Mr. Theobald gives the following summary of conclusions as regards this wash:—Lime and salt wash ($1\frac{1}{2}$ cwt. fresh lime, 40 lb. salt, to 100 gallons of water) prevents the hatching of large numbers of the apple suckers, its effect varying according to the thickness put on the trees, the thoroughness of the application, and the extent to which it has dried before rain comes. No ingredient yet known prevents to any great extent the flaking-off of the lime on smooth wood. Waterglass or paraffin to some extent causes it to hold slightly better. Up to 40 lb. of salt may be used to 100 gallons of water, but more than that amount may damage the buds of some varieties. As much lime as possible should be used so as to make a thick coating.

Spraying against various Insects and Fungi (Worcester C. C., Reports by Kenneth G. Furley; Thirteenth Annual Report on the County Garden, Droitwich, 1908).—In the case of Mussel Scale, a double strength caustic soda wash (2 lb. caustic soda, $\frac{3}{4}$ lb. soft soap and 10 gallons of water) entirely killed the scale. Strong paraffin emulsion and Mr. S. U. Pickering's paraffin and soda wash did not kill the scale at once, but in the following spring when the trees were examined the scale insect eggs were found to be dead, showing that it probably takes some little time for the paraffin washes to penetrate the scale. Ordinary caustic alkali wash killed a certain amount of eggs, but by no means all.

The Gooseberry Red Spider (*Bryobia pretiosa*) was effectively destroyed by a wash composed of 5 gallons of paraffin, 8 lb. soft soap, and water to make up 160 gallons.

These Reports also contain notes on the treatment for Winter Moth, Apple and Pear Scab, and Brown Rot Fungus.

The Report on the Droitwich Garden gives the result of winter washing and of treatment against the pear midge and canker.

Bordeaux Mixture and other Copper Fungicides.—(*Woburn Experimental Fruit Farm, Eleventh Report*, 1910).—The eleventh Report of the Woburn Fruit Farm, by the Duke of Bedford and Mr. S. U. Pickering, deals with the nature and action of copper fungicides, and in particular of Bordeaux mixture, and gives an account of experiments on scorching and fungicidal action.

The chemical questions involved in the composition of copper fungicides are discussed and many points in connection with the manufacture of ordinary Bordeaux mixture are examined; the results of tests of the comparative efficiency of Bordeaux paste are also given. The second part of the Report deals with experiments on the action of these substances on vegetable organisms.

Various Insect Pests (*Journal of South-Eastern Agric. Coll.*, No. 17, 1908).—Mr. Theobald's Report on Economic Zoology contains the results of observations and trials made in regard to a large number of insect pests which were reported during 1908.

"*Rhizoctonia*" *Disease of Sea-Kale* (*Journal of South-Eastern Agric. Coll.*, No. 17, 1908).—Experiments were undertaken in 1907 to test the effect of various remedial measures on the fungus *Rhizoctonia violacea*. The substances used included copper sulphate, iron sulphate, corrosive sublimate, carbolic acid, formalin, petroleum, flowers of sulphur, and lime, and the most satisfactory results were obtained by the application of a solution composed of 1 oz. carbolic acid to 1 gallon of water. The solution was applied to the soil with a watering can with a fine rose a few days before planting the cuttings of sea-kale. Further tests will be made to confirm the results obtained, but gardeners troubled with this disease on sea-kale or other plants are recommended to try this simple remedy. One ounce of carbolic acid is sufficient for about 4 sq. feet.

Wart Disease, or Black Scab of Potatoes (*Journal of South-Eastern Agric. Coll.*, No. 17, 1908).—In the autumn of 1907 some experiments were made in which the resting sporangia of *Chrysophlyctis endobiotica* were subjected to artificial freezing in order to see what effect such treatment would have on their powers of germination. Exposure to low temperatures did not destroy the germinating powers of the resting spores, so that any system of winter ploughing of soil infested with the disease, with the object of destroying the spores by exposure to frost, would seem likely to be useless.

Effect of Carbon Bisulphide on Wireworms (*Journal of South-Eastern Agric. Coll.*, No. 17, 1908).—The usual practice in hop gardens, where wireworms are troublesome, is to trap them with pieces of mangold placed at the side of each hill. This is a somewhat expensive operation and may cost about five shillings per acre annually, so it was determined to try an injection of carbon bisulphide.

Two rows in the College garden were selected, and the hills in one row were treated by injecting two ounces of carbon bisulphide into each,

at four points about two feet away from each hill. The hills in the other row were left untreated.

The hills in each row were trapped with mangold in the usual way, and after about three weeks the traps were pulled out and the wireworms carefully counted.

In eighty hills in the row treated with bisulphide there were 336 wireworms, whilst in eighty hills in the untreated row there were 362 wireworms. This result shows that the injection of carbon bisulphide is of very little use for wireworm in hops.

Experiments with Hop Washes (Journal of South-Eastern Agric. Coll., No. 17, 1908).—From theoretical considerations, a wash made from soft soap alone would be as effectual for killing hop aphids as a mixture of soft soap and quassia containing the same amount of soap, the argument being that the soft soap will kill all it touches, and that the addition of the quassia is therefore unnecessary. The majority of practical hop growers, however, find that the mixture of soap and quassia is more effectual.

In order to test this point, the main part of the College garden was washed twice with a horse machine with a wash containing 7 lb. of soft soap and 7 lb. of quassia per 100 gallons, and on the same day 10 rows were washed with a solution of 7 lb. of soft soap only per 100 gallons.

The number of live lice three days after each washing was carefully counted on 100 selected leaves, and for every louse on the leaves washed with soap and quassia there were two lice on the leaves washed with soap alone. After the second and third washings the ratio was still greater, and the results showed that soap and quassia is much more effectual than soap alone as a wash for hop aphids.

A patent paraffin soap wash was also tried in comparison with soap and quassia, but proved very inferior. The value of a solution of soap as an aphicide is due to the fact that the solution is capable of forming a lather, and when hop leaves and aphids are washed with this, it wets them and forms a thin film over their surfaces, and so covers up the breathing pores of the lice, which are, in consequence, suffocated. The presence of the paraffin in this wash prevented the soap solution from forming a lather, and consequently in this case the soap did not help to kill the aphids.

Warble Flies (Journal of Dept. of Agric. for Ireland, January, 1908, and April, 1909).—These publications record the experiments carried out by Professor G. H. Carpenter and J. W. Steen.

The general conclusion arrived at was that the various dressings that have been recommended as preventing egg-laying by warble flies are valueless as a protection. Calves and yearlings which were sprayed all over every day from June to September were found to be struck by the fly and to have as many warbles the next spring as animals altogether untreated.

The smear made of train-oil, spirits of tar and sulphur proved not only useless but directly harmful when applied to calves, as it made the hair come out and rendered the skin sore. It did little injury to yearlings or older cattle unless used very frequently.

The common warble fly in Ireland is *Hypoderma bovis*, not as in England, *H. lineata*, and observation showed that the eggs are laid

most frequently on the legs. The fly now and then strikes at the shoulder, rarely at the back and ribs. The eggs are laid on the hairs. Prof. Carpenter considered that his experiments in 1906-7 with muzzled calves showed that the maggot bores through the skin and does not enter the beast's body by the mouth, as is believed to be the case by many observers, but this question is still being investigated. In 1907-8 two muzzled calves had no warbles, while 29 unmuzzled and untreated calves showed an average of 7.7 warbles each. In 1908-9 six muzzled calves showed an average of 4.66 each and nine unmuzzled calves 4.33 each.

The dressings usually applied in summer being useless, the destruction of the maggots in winter and spring is recommended. The animals should be examined at least every two or three weeks from the middle of February to the end of June, and as the warbles ripen the maggots should be pressed out and crushed. This practice is more certain, safer, and easier, than the application of sticky or poisonous dressings to the warble holes with the object of killing the maggots.

In 1907, 2,090 maggots were squeezed out of 194 cattle on the farm where the investigation was being conducted, an average of 10.77 per beast. In the spring of 1908, 132 of these cattle were still on the farm, and had been left throughout the summer of 1907 without any kind of dressing or protection against the fly. From these cattle 586 maggots were squeezed out, an average of 4.44 per beast, and it is considered that this reduction is due to the destruction in the previous year. In 1909 the proportion seemed to be about the same, and a further reduction is not anticipated until the maggots are destroyed also on neighbouring farms. The cattle grazing on the outskirts of the farm suffered much more than those near the centre of the farm, where it is believed that the flies were nearly exterminated.

FRUIT AND CIDER.

Experiments in Cider Making (National Fruit and Cider Institute, Report, 1908).—In the cider-making season of 1907-8 the experimental work in the cider-house consisted mainly of the examination of a number of varieties of apples from the vintage point of view, single-variety ciders being made from each kind as in previous years. Details of the characters and qualities of the individual ciders are given in the report. Probably the most noteworthy result which this work on single-variety ciders has established is that the quality of cider depends primarily upon the kind of apples from which it is made, and that other factors, such as the ferments present, the methods of manufacture, and general management, although important and capable of exercising an appreciable influence upon the nature of the product, nevertheless take a secondary place, and cannot be compared with the fruit factor in their power of determining the quality of the beverage. Unfortunately for the cider-maker, many of the varieties most desirable from a vintage point of view make comparatively poor trees and yield badly in most situations, while on the other hand some quick-growing, vigorous, and heavily cropping trees, yield fruit of inferior vintage quality.

It is, perhaps, premature at present to assert that the vintage quality of a variety varies inversely with its vigour of growth, but

certainly the results thus far obtained during the course of the experimental work at the Institute appear to indicate that there may be a more or less direct connection between the nature of the growth of a tree and the type of cider produced from its fruit. At any rate in the case of certain varieties it seems that heavy cropping powers and high vintage quality are incompatible.

It is, therefore, necessary to collect information which will enable an opinion to be formed as to the comparative advantages of growing heavy cropping varieties which yield a large bulk of cider capable of commanding only a moderate market price, or less heavy cropping kinds which produce a smaller bulk of cider of higher market value. In due course such statistics will be available from the experimental orchards which have recently been planted.

Since the work on single-variety ciders began, a large number of the more widely grown sorts have been examined, and it is becoming possible to make some progress with regard to the selection of individual varieties as being worthy of extensive propagation. In order to make the recommendations as authoritative as possible, it is proposed that a committee of recognised experts on vintage fruit should be formed, and that a list of recommended varieties should be published by that body after examination of all available data.

The report also discusses the results of investigations into the following subjects:—The influence on the quality of the fruit of the root stock, the intermediate stock, and the age of the tree; the relation between the quality of the fruit and the method of treatment of the trees; the variation in the quality of the juices during the pressing of the cheese; cider yeasts; and the filtration of cider.

Influence of Grass on the Growth of Fruit Trees (National Fruit and Cider Institute, Report, 1908).—The orchard of the Institute was planted in 1904 with vintage varieties of apples and pears, and afforded an opportunity of investigating the effect of grass on the growth of trees. At the time of planting, circular holes, 6 ft. in diameter, were dug and this space was kept cultivated.

At the end of a year after planting it was arranged that at least one tree of each variety should be treated in each of the following ways:—(a) the cultivated area around the tree should remain 6 ft. in diameter, (b) the cultivated area should be extended to a circle 9 ft. in diameter, and (c) the cultivated area should be allowed to grass over. The measurement of the girth of the trees (at a height of 5 ft. 6 in.), is not the most satisfactory means of demonstrating the effect of the treatment, but it was adopted as being the one involving the least labour, and the results obtained, expressed in percentages, were as follows:—

Treatment of trees.	No. of trees.	Girth in March, 1906.	Average girth. March, 1909.
Cultivated area, 9 ft.	30	100	194
" " 6 ft.	24	100	177
Grass	15	100	165

There can be no doubt from these figures that the grassing over of the original cultivated area of 6 ft. diameter resulted in an appreciable check in the rate of growth, while the extension of the cultivated area to 9 ft. diameter was beneficial. This seems to show that it is the fine rootlets actively engaged in the absorption of food substances

which are most affected by the presence of grass. These rootlets extended beyond the limits of the original 6 ft., and therefore benefited by the cultivation of the 9 ft. area.

Effect of Grass on Fruit Trees (Harper Adams Agric. Coll., Field Experiments, Report, 1908).—The difference in the growth of trees on grass and those on cultivated ground has been tested since 1905, and the results are much in favour of those on cultivated ground. A variation was introduced in 1907, when the turf was removed from each alternate tree in grass for 4 sq. yards, and the surface kept free from weeds. The results are as follows:—

Average diameter of trees in inches ($4\frac{1}{2}$ feet above ground).				
	On grass, 1905.	On grass 1908.	On cultivated ground 1908.	Portion with turf removed 1908.
Cox's Orange Pippin ...	0.82	1.06	2.38	1.56
Bramley's Seedling ...	0.78	1.25	2.48	1.63
Bismark ...	1.03	1.43	2.28	1.69

The removal of the grass has at once resulted in an increased growth.

SUMMARY OF FOREIGN EXPERIMENTS.

Feeding Value of Soy Bean Cake.—The following is a summary of an article on Soy Bean meal and cake, by Nils Hansson, of the Swedish Central Institute for Agricultural Experiments (*U.S. Consular Reports*, No. 3666, 1909):—

In connection with the experiments with soy bean meal and soy bean cake, a series of analyses have been made into their chemical composition, and the following figures represent the average result from twenty samples:—

		Soy bean cake.	Soy bean meal.
		per cent.	per cent.
Water ..	...	11.11	11.56
Crude protein .	...	43.29	45.48
Crude fat ...	...	6.10	1.88
Carbohydrates ...	...	34.04	35.33
Ashes ...	...	5.46	5.75
Total ...	...	100.00	100.00

A soy bean cake meal has also appeared in the market, and differs from ordinary extracted soy bean meal in that it contains the same percentage of fat as the soy bean cake.

On account of their low percentage of cellulose, which, according to the tests, varies from 2.67 to 5.27 per cent., these foods are highly digestible. In this respect the soy bean cake seems to be somewhat better than the meal, but in comparison with other food stuffs both rank very high.

When the percentage of water has been low enough, neither the cake nor meal has undergone any change during storage for four to five months. On the other hand, two samples of meal which contained 15 per cent. of water, and were kept for some time, got mouldy, and showed signs of decomposition. Buyers should therefore be careful to see that the moisture does not exceed 13 or 14 per cent.

In the feeding experiments made, it has been shown that soy bean cake, as well as bean meal, is eagerly consumed by cattle, and daily rations as large as 3.3 to 4.4 lb. have not caused any unfavourable

dietary effects. In this respect these fodder stuffs seem to have a slightly loosening effect, comparable to that of good sunflower or peanut cake.

Soy bean cake, as well as meal, has a higher food value than ordinary sunflower cake, and it has been found by experiment that 0.90 kilo. (nearly 2 lb.) of cake, or a little more meal, is on the average an equivalent substitute for 2½ lb. of sunflower cake. On the two experimental farms, the soy bean cake gave nearly identical results, while the soy bean meal, by reason of varying composition, gave figures ranging from under 2 to 2½ lbs.

With reference to the influence of these foods on the percentage of fat in the milk the results of the experiments are conflicting. Some of them show a decrease, others an increase. If the results obtained in Sweden are compared with the results obtained in Germany, it would seem that the soy bean materials have some tendency to lower the percentage of fat in the milk produced, though not in such a degree as to be of any practical importance.

No change in the appearance or taste of the milk has been detected, but the churning tests made in the summer time have shown that the butter had a pronounced taste when large quantities of soy meal or cake were used. Therefore, where the milk is utilised for the production of butter, the daily ration of soy bean meal or cake given to each cow should not exceed 1 to 1½ lb.

With this limitation, soy bean meal and cake may be considered as good feeding stuffs for milch cows.

Manuring of Plum Trees (Mitt. Deutschen Landw.-Gesell., No. 2, 1910).—An experiment in the manuring of fruit trees, extending over eleven years, is being carried out on an orchard belonging to the town of Germersheim, under the direction of the Agricultural Instructor, Herr Hoffmann, and the results for five years are given in the above publication. The soil is a light sand, poor in plant food, and the condition of the trees previous to the commencement of the experiment was very unsatisfactory. The object of the trial was to show (1) the effect of nitrogen in the form of sulphate of ammonia and nitrate of soda; (2) the specific effect of nitrogen, phosphoric acid, potash and lime; and (3) the action of these manures in a liquid and in a dry form. Six plots of 48 trees each were laid out and these were subdivided into sections. The general plan was to compare the effect of (1) nitrogen, potash and lime; (2) nitrogen, phosphate and lime; (3) potash, phosphate and lime; (4) lime only; (5) a complete heavy dressing; and (6) a complete light or medium dressing. Part of Plot 4 was left unmanured, and on each plot the manures were applied both in a liquid form and dry.

The standard quantities of manure applied per tree were as follows:—Sulphate of ammonia, 8 oz.; nitrate of soda, 10½ oz.; potash, 40 per cent., 5½ oz.; superphosphate, 18 per cent., 3½ oz.; lime, 3½ lb., every three years. In the case of Plot 5 (a and b) three times the above quantity of nitrogen, phosphate and potash was applied.

A glance at the table on p. 942 shows that the best results were obtained from Plot 5, which received the heavy manurial dressing, while Plot 6, which also received a complete dressing, but in smaller quantities, takes the second place. The result of a lack of nitrogen is shown by Plots 3 and 4. The application of the manure in liquid form did not

prove advantageous, and no practical difference was observed on the average between sulphate of ammonia and nitrate of soda. If the cost of the manures is deducted from the value of the increased crop, a gain is shown in each case, except on Plot 3, the greatest gain being on Plot 5.

The following table shows the average crop in the five years 1904-8, and the average increase in girth.

Plot		Average crop		Average increase in girth	
		Manure applied in liquid form lb	Manure applied dry lb	Manure in liquid form in	Manure applied dry in
1 (a)	Sulphate of ammonia, potash, and lime	60 2	123 4	0 41	0 45
1 (b)	Nitrate of soda, potash, and lime	89 7	135 5	0 41	0 53
2 (a)	Sulphate of ammonia, superphosphate, and lime	102 0	102 5	0 46	0 49
2 (b)	Nitrate of soda, superphosphate, and lime	114 2	81 1	0 47	0 53
3	Potash, superphosphate, and lime	5 5	9 0	0 30	0 24
4 (a)	Lime	9 7	34 6	0 36	0 32
4 (b)	Unmanured	27 6	23 4	0 42	0 35
5 (a)	Potash, superphosphate, ammonia, and lime (heavy)	290 3	300 6	0 61	0 69
5 (b)	Potash, superphosphate, nitrate, and lime (heavy)	255 0	294 2	0 64	0 63
6 (a)	Potash, superphosphate, ammonia, and lime (light)	119 2	137 1	0 55	0 47
6 (b)	Potash, superphosphate, nitrate, and lime (light)	121 4	142 8	0 54	0 54

IMPORTATION AND OTHER REGULATIONS

Butter Legislation in Holland—The Netherland Government has recently issued Regulations regarding the Butter Act of 1908, which came into force on the 1st January, 1910.*

The new legislation provides, *inter alia*, that no butter can be supplied or exported if it contains less than 80 per cent. of butter-fat, and margarine is similarly dealt with if, in determining the neutralising figure of the volatile fatty acids in five grammes of melted fat, it indicates a Reichert Wollny number greater than 10. The supply of butter from premises where margarine is manufactured is prohibited, except in special cases, which must be authorised officially. The fats which may be kept on premises where butter is made are restricted to (1) lubricating oil or other mineral oils or fats, (2) other lubricants which are unfit for the adulteration of butter, and (3) butter colour. Other oils and fats are permitted in a small quantity and for private use to farmers who deal only with the milk of their own cows, provided that they do not trade in margarine or other oils or fats suitable for adulteration. Imported butter must bear a certificate of origin.

The Regulations relating to the amount of water provide that it must not exceed 16 per cent., whether the butter be salted or unsalted.

* An English translation of the Act and Regulations can be consulted at the Office of the Board of Agriculture and Fisheries, 8, Whitehall Place, S.W.

When that limit is approached, the controlling stations take action by (a) withdrawing the right to use the official marks from persons who have intentionally caused the percentage of water to be exceeded, and their membership of the controlling station is cancelled; (b) in the case of a first offence the persons concerned are temporarily prohibited from using the official marks if the delinquents are in the habit of manufacturing butter containing a percentage of water of from 15½ to 16 per cent.; such prohibition to continue until the members have provided sufficient guarantees against a repetition of the offence.

Importation of Potatoes into Nyasaland.—By a Proclamation (No. 131, of 1909), the importation of potatoes into Nyasaland is allowed on condition that each consignment is accompanied by a certificate from the consignor to the effect that the potatoes were grown in a particular locality, and in the case of the United Kingdom by a further certificate from the Board of Agriculture and Fisheries, showing that *Chrysophlyctis endobiotica* has not been declared to exist in that locality. The regulations on the subject given in this *Journal*, July, 1909, have been cancelled.

Importation of Bees into Natal.—An Act dated 22nd November, 1909 (No. 15) provides that bees and their larvæ, honey, beeswax, including foundation comb, honeycomb, and other unmanufactured products of agriculture, shall not be imported into Natal without the consent of the Minister of Agriculture and subject to such conditions as may be prescribed.

Importation of Plants into Orange River Colony.—A Notice dated 15th November, 1909, which has been issued by the Agricultural Department of the Orange River Colony, imposes restrictions for the purpose of preventing the introduction of insect pests, and on the importation of fruit-bearing plants and stocks. A copy of the Regulation can be seen at the Office of the Board.

Importation of Cattle into Costa Rica.—According to a Decree, dated October 26th, 1909, the Government will pay the sea and land freight on male or female pedigree cattle imported from Europe or the United States. This payment will include the cost of land and marine insurance, the cost of food, and the care of the cattle in steamers and trains, and also the cost where the cattle may be forwarded to their destination by other means than by railway. The payments will be made until December 31st, 1911.

MISCELLANEOUS NOTES.

Horticultural Exhibition at Florence.—The Board of Trade have received, through the Italian Embassy in London, a copy of the programme of a Horticultural Exhibition, with international sections, to be held at Florence in May, 1911. Applications for space will be received up to 31st March, 1911, by the Executive Committee of the Exhibition.

The copy of the programme (in Italian), together with particulars (in French) of the international sections of the exhibition, may be seen by British firms interested on application at the Commercial Intelligence Branch of the Board of Trade, 73, Basinghall Street, London, E.C.

Agricultural Exhibition at Buenos Aires.—The Agricultural Exhibition is divided into two departments, (a) Live stock, and (b) Agricultural machinery and products. In the latter department an area of 54,000 square feet, contained in five pavilions, has been retained for the British section, and of this space 35,000 square feet have been applied for. Allowing for the necessary passageways in the space for which application has already been made, there is still available an area of 7,000 square feet for future applicants.

The last date for receiving applications is fixed at 28th February. Applications will be received at the Exhibitions Branch of the Board of Trade, Queen Anne's Chambers, S.W., up to 4th February, or for cabling (at cost of applicant) up to 27th February. The buildings will be open for the reception of exhibits on 1st April, and none will be received after 10th May. No charge will be made for space in the buildings; and light, power, and water will be free. In addition to the buildings comprising the British section, arrangements have been made for the erection of several private installations in the adjoining open space. The Exhibition will be opened on 3rd June and will close on 31st July, but exhibitors will have the right to retain their installations *in situ* until 25th November.

With reference to this Exhibition, it may be noted that the importation into Argentina of agricultural machinery and implements for the nine months from 1st January to 30th September, 1909, was valued at £735,000.

Memoranda of information giving detailed particulars regarding the Agricultural Exhibition and the Hygienic Exhibition are being issued by the Exhibitions Branch of the Board of Trade, Queen Anne's Chambers, S.W. Copies may be obtained on application at that Branch or at the Commercial Intelligence Branch of the Board of Trade, 73, Basinghall Street, London, E.C.

An International Congress of Agricultural Associations will be held at Brussels from 19th to 22nd September, 1910, in connection with the Brussels Exhibition.

International Congress of Agricultural Associations. It is pointed out in the preliminary programme that the association of growers in societies and unions constitutes one of the most powerful factors in the advancement of agriculture. The methods adopted in different countries even for the attainment of similar objects vary very greatly, and it is thought that the comparison of the various systems and the discussion of methods in an international assembly will be productive of good results. Some other matters of importance to the grower, such as the improvement of roads and the diminution of agricultural labour will also be included, but the Congress does not propose to touch on technical or economic questions connected with general agriculture or its allied industries.

The Congress will be divided into ten sections as follows:—(1) Societies representing agriculture or horticulture in general; (2) Farmers' Associations, Societies, or Clubs; (3) Associations for production (cattle and sheep breeding, milk control, improvement of seed); (4) Societies for co-operative manufacture, purchase, export, sale, con-

sumption, &c.; (5) Credit banks and Societies for live-stock insurance and other forms of thrift; (6) Demography and hygiene (including housing); (7) Agricultural labour; (8) Means of transport; (9) Other measures for the improvement of the condition of the agriculturist, including public lighting and water supply, public amusements, diffusion of small holdings, rural housing, market gardening for workmen, &c.; (10) Organisation of inquiries, shows, and exhibitions, distribution of information by agricultural societies, &c.

Societies or private persons can participate in the Congress, the subscriptions for each person or representative being 15 francs. The office of the Congress is located at 220 Chaussée d'Alsemberg, Brussels. Copies of the programme in English can be obtained from the office of the Board, 4 Whitehall Place, S.W.

Production of Nitrates in Norway.—According to a note in the *Board of Trade Journal* (December 23rd, 1909), the value of the output of nitrates in Norway in 1908 was about £111,000.

Notes on There are now five companies producing or about
Agriculture Abroad. to produce nitrates, and when the works now being constructed are complete, it is estimated that the production will have a value of £1,278,000.

The Norwegian Workmen's Small Holdings and Dwellings Bank.—H. M. Minister at Christiania, has forwarded to the Board of Trade an account of this institution which was established in accordance with a law dated June 9th, 1903. The Bank has for its objects the granting of loans to Norwegian citizens of restricted means for the purpose of acquiring small holdings, or to local rural councils for acquiring land and building thereon, such land to be parcelled out into small holdings. In neither case must the rate of interest charged exceed $3\frac{1}{2}$ per cent. per annum. Loans may also be granted to citizens of small means for the purpose of building, completing or acquiring their own dwellings.

Loans are not granted to owners of property exceeding £83 if residing in the country, or £111 if residing in a town, and all applications must be approved by a Committee of the Local Council appointed for dealing with such matters. In the case of small holdings the applicant must be certified by this Committee as being competent "to own, manage and keep up" the holding as a farm, and he must not own so much land that this, together with the land he wishes to acquire, would exceed in area or value the maximum allowed. A holding on which a loan may be granted must not contain less than an acre and a quarter, or more than five acres of cultivated or cultivable land, nor must its loan value exceed £167, including a maximum of £111 for the land alone.

The Bank holds mortgages on the properties as securities for the loans, and any losses sustained by the Bank on account of breach of contract on the part of the borrowers or guarantors are refunded to it by the Exchequer. On March 31st, 1908, the loans granted for workmen's holdings, &c., amounted in the aggregate to about £625,000. Applications for loans are principally made by labourers, factory workers, artisans and fishermen. In 1907-1908 only 36 applications were rejected out of a total of nearly 2,500 received. (*Labour Gazette*, Dec., 1909.)

Area of Forests in Russia.—Mr. Consul A. W. Woodhouse, in his Report on the Foreign Commerce of Russia (*F. O. Reports, Annual Series, No. 4370*) draws particular attention to the vast resources of the Empire which are still awaiting development in the forests of Northern Russia and Siberia. It is reported that within ten years the forests in the United States will no longer be able to supply the demand for wood pulp for the manufacture of paper. It is fair to presume that long before that time the production of wood pulp in Russia will have developed into an important industry. At present the production of this commodity is insignificant.

According to the latest available figures the State forests in 1907 covered the following areas:—European Russia, 228,973,200 acres; Caucasus, 8,451,650 acres, and Asiatic Russia (surveyed), 192,661,000 acres, a total of 430 million acres surveyed, and in addition there are some 465,000,000 acres of unsurveyed forest land in Asiatic Russia.

The total output of timber from the State forests in 1907 was 1,286,560,000 cubic feet, and the total amount realised by the Department of Forestry on the sale of timber, rent of land, &c., was £6,316,077. The expenditure, including £168,000 for felling and sawing logs, &c., amounted to £1,304,100, which left a profit of £5,011,977. Six million pounds worth of this timber was sold to dealers as standing timber, and the greater part of it was eventually exported in the shape of logs, deals, battens, pit-props, &c. It is noteworthy that the re-afforestation of the State lands more than compensates for the quantities annually cut down.

Apart from the above-mentioned timber lands which belong exclusively to the State, there are other forests in European Russia, having an area of 200,000,000 acres.

Visitors to Kew Gardens during 1909.—The number of persons who visited the Royal Botanic Gardens, Kew, during the year 1909 was 3,360,221. These figures represent an increase of 397,507 visitors over the year 1907, when the numbers were 2,962,714, which was the largest number previously recorded.

The increased popularity of Kew Gardens during recent years is shown by the steady annual growth in the number of visitors. The average for the ten years 1893–1902 was 1,352,425, in 1907 that number was more than doubled, and during the past year a further substantial increase has taken place.

Year.	Sundays.	Week-days.	Total.
1903	568,726	783,822	1,352,548
1904	675,225	904,441	1,579,666
1905	853,631	970,688	1,824,319
1906	867,148	1,472,344	2,339,492
1907	1,268,501	1,694,213	2,962,714
1908	1,321,384	1,388,836	2,710,220
1909	1,384,369	1,975,852	3,360,221

A feature of the year 1909 was the exceptionally large number of persons visiting the gardens in August, no less than 1,016,114 being recorded in that month.

During the *first* week in January the conditions were very mild and dull, but day temperature was above the average, the difference from the normal being large in most districts.

Notes on the Weather Bright sunshine was "scanty" or "very scanty" everywhere, except in England N.W. and Scotland E. Rainfall, however, was "light" or "very light" in all districts.

In the *second* week the weather became very unsettled, some amount of rain in the South, and of hail, sleet, or snow in the North of the Kingdom falling almost daily. Warmth was "unusual" all over England except N.E., where it was "moderate," and "moderate" in Scotland. The excess over the normal was considerable generally, and as great as $4\frac{1}{2}$ deg. Fahr. in the Midland counties and England S.E., and 5 deg. Fahr. in England E. Sunshine was "very abundant" in England E., and "abundant" in England N.E., Midlands, and S.E. Rainfall exceeded the normal in all districts except England E.

In the *third* week very variable conditions prevailed, rain or snow falling frequently. In most cases, however, the actual amount of precipitation was slight and nearly every locality experienced some very bright periods. Sunshine was, therefore, "abundant" or "very abundant" everywhere but in England S.W.

The *fourth* week was generally similar to the third week, but the conditions were intensified. Temperature was much below the average, warmth being "deficient" or "very deficient" in every district, and rainfall and snow were frequent, yet the sky was often partly or entirely cloudless, and sunshine was "abundant" all over the kingdom, except in Scotland E. and England N.E., where it was "moderate." Rainfall was "very heavy" in England N.E., E., S.E., and S.W., and "heavy" in England N.W. and the Midlands. In Scotland it was "moderate."

The International Institute of Agriculture, Rome, has begun the publication of reports on some of the principal crops—*viz.*, wheat, rye, barley, oats, maize, rice, and cotton. It is proposed to issue regularly, about the 20th of each month, a Bulletin dealing with the crops progressively from the time of seeding till harvest.

Notes on Crop Prospects Abroad.

The area sown will be given as far as possible, and a statement as to conditions at time of sowing; this will be followed by statements as to the condition of the growing crops, an approximate estimate of the yield, and finally corrected figures of the total production.

Owing to the wide differences in the season of sowing and harvesting crops in different parts of the world, the countries will be divided into three geographical zones, *viz.*—(1) *Northern zone*: countries of North America, excepting Mexico; Europe; and Russia in Asia; (2) *Central zone*: Mexico and countries of Central America and the northern part of South America; northern part of Africa; Central and Southern Asia; (3) *Southern zone*: all countries south of the Central zone in South America and Africa; also Australia and New Zealand.

The following information was issued on January 20th, 1910, and represents the particulars which were available of the area sown in the autumn of 1909, with statements as to the condition of the crop on January 1st. It is necessarily very incomplete owing to the initial difficulties in the way of obtaining the necessary information.

WINTER WHEAT.

Name of Country.	Area sown (Autumn, 1909).			Condition, January 1st. 100 represents an average. (*)		
	Absolute figures.	Compared with harvested area of last year (1909).	Compared with average harvested area of previous years	1910.	1909.	10 years average.
	acres.	per cent.	per cent.	per cent.	per cent.	per cent.
Germany ...	—	—	—	⁸ 2'4	⁸ 3'3	2'5
Hungary ¹ ..	8,315,500	103'3	—	110	—	—
Belgium ..	—	—	—	100	—	—
Bulgaria ..	—	—	—	103	—	—
Denmark ..	¹ —	—	—	98	—	—
Spain ...	9,469,980	101'4	—	—	—	—
United States..	33,469,900	² 107'9	² 106'5	⁷ 95'8	⁷ 85'3	91'5
Canada ..	749,700	113	—	¹⁰ 95	—	—
India ³ ..	22,196,500	103'2	—	—	—	—
Luxemburg ..	27,860	105	—	⁶ 2'24	—	—
San Marino ..	5,080	100	—	100	—	—
Sweden ⁴ ..	222,300	107	—	100	—	—
Switzerland ⁵ ..	152,890	100	—	100	—	—

(*) The word "average" is intended to represent a condition promising a yield per hectare (or unit of surface) equal to the average yield of the last ten (10) years.

¹ Area sown, about the same as in 1907 (99,770 acres).

² Percentage of the area sown.

³ Approximate estimate.

⁴ Approximate calculations.

⁵ Including 58,540 acres of spelt.

⁶ Condition of the crops on November 15 of the preceding year; scale 1-5; 3 = average.

⁷ Percentage of "normal" condition on December 1st of last year.

⁸ Approximate estimate.

⁹ This figure represents about 85 per cent. of the total area under wheat. A certain number of native states and the English provinces of Eastern Bengal and Assam (which generally represent about 15 per cent.) are not included.

¹⁰ Percentages of a "standard" condition.

The information available as to the condition of the winter wheat crop is as follows:—

Germany.—Much better than last year, and slightly better than the average for ten years.

Hungary.—Temperature favourable; sufficient rain; in general the crops are progressing favourably. Damage caused by the Hessian fly and the frit fly, approximately 10 per cent.; by other insects 2 per cent.

Denmark.—Sowing delayed by wet weather.

Spain.—The condition of the crops is, in general, good throughout the whole of Spain; in most districts sowing took place at the customary time.

United States.—Much better than last year, and slightly better than the average for the past ten years.

Great Britain.—On account of the unfavourable temperature which prevailed during the past autumn, it is believed that the area sown in 1909 is smaller than the area sown for the same period in 1908.

Luxemburg.—During the commencement of seeding the weather was fairly good in all the communes; later, however, from the middle of October until the end of the year, considerable rain fell, delaying seed-

ing in most of the communes. Wheat especially was sown under unfavourable conditions in almost all of the communes.

Russia-in-Europe.—According to the official report published December 13/26, the condition of the crops was not everywhere satisfactory. In almost all the Central, South-Eastern and Eastern Governments the crops were in an unsatisfactory condition when they became covered with snow. The conditions, however, are better outside the Black Soil Zone, in the Governments of the North-West, a part of the North, and also the South-West. In the other Governments the conditions of crops are generally satisfactory.

There has been a considerable decrease in the area sown, especially in those Governments where the conditions have been mentioned as unsatisfactory.

In the report of January 2nd, 1910, it is stated that the condition of the crops had not much deteriorated at the commencement of winter, except in three Governments. The general condition of crops has not changed; in several Governments there has been an improvement.

San Marino.—Rainy season without harmful results.

Sweden.—Autumn very favourable for the development of crops.

Switzerland.—Early sown crops are progressing well, though later seedings are less favourable. In many districts field mice and voles, and also slugs have caused some damage.

WINTER RYE.

Name of Country	Area sown, Autumn, 1909			Condition, January 1st 100 represents an average (*)		
	Absolute figures	Compared with harvested area of last year (1909)	Compared with average harvested area of pre- vious years	1910	1909.	Ten years average.
	acres.	per cent.	per cent.	per cent.	per cent.	per cent.
Germany	—	—	—	⁴ 2'3	⁴ 3 2	2'5
Hungary ²	{ (c) 2,586,090 (d) 148,200 }	{ (c) 104 3 (d) 110 5 }	—	105	—	—
Belgium	—	—	—	100	—	—
Bulgaria	—	—	—	103	—	—
Denmark	¹	—	—	98	—	—
Spain	2,056,579	100	—	—	—	—
United States	2,154,156	² 101 2	—	⁵ 94 1	⁵ 87'6	93 9
Luxemburg ..	26,725	109 7	—	⁴ 1'91	—	—
Norway	37,186	—	—	⁵ 100	—	—
Sweden	⁷ 963,300	99	—	100	—	—
Switzerland ⁸	53,846	100	—	80	—	—

(*) The word "average" is intended to represent a condition promising a yield per hectare (or unit of surface) equal to the average yield of the last ten (10) years.

¹ Area sown, about the same as in 1907 (679,737) acres.

² Percentage (revised) of the area sown in the autumn of 1908.

³ c = rye; d = meslin; approximate estimates.

⁴ Condition of crops on November 15th last year; scale 1—5, 1 = very good; 3 = average.

⁵ Percentage of a "normal" condition on December 1st of last year.

⁶ Supposition.

⁷ Approximate calculations.

⁸ Approximate estimates.

The information as to the condition of the winter rye crop is as follows. In the case of Germany, Denmark, Spain, and the United States, the remarks as to wheat are applicable to rye.

Hungary.—Sowing took place in favourable temperature, with sufficient rain. In general, the crops are progressing favourably. Damage caused by insects = 4–5 per cent.

Luxemburg.—During the commencement of seeding the weather was fairly good; but later, much rain fell, delaying sowing in most of the communes.

Sweden.—In autumn, more than the normal amount of rain fell in the North and South; and in the Central regions less than the average; temperature was above the normal, and very favourable for the development of the crops.

Switzerland.—On account of rains and of only a medium sowing, the rye has, in many cases, come up badly. In several districts, damage has been caused by field mice, voles and slugs.

AREA AND PRODUCTION OF WHEAT IN THE SOUTHERN ZONE.

Name of Country	Area harvested (1909–10).			Production (1909–10). Preliminary statement.		
	Absolute figures.	Compared with last year (1908–09)	Compared with average of previous years	Total production. Absolute figures	Compared with last year	Compared with average of previous years.
Argentina	acres. 14,416,279	per cent. 96	per cent. 146	cwt. 1 84,195,000	per cent. —	per cent. 149
Australia.	1 6,215,941	—	(1903–1907) 107	1 43,917,000	—	(1903–1907) 111
Chili	1 1,432,600	—	(1903–1906) 161	1 12,594,000	—	(1903–1906) 180
Peru	—	—	—	787 000	—	—
Uruguay.	1 716,300	—	(1905–1907) 109	2 5,136,000	—	(1905–1907) 151

¹ Preliminary estimate.

² Approximation.

³ This information is not furnished by the Central Government of the "Commonwealth," but by Governments of the different provinces.

Argentina.—The British Consul at Rosario, writing on January 8th, states that information obtained from reliable sources shows that the yield of the wheat and linseed crops now being harvested will be considerably less than that of last year, and the grain of poorer quality. Owing to unfavourable conditions the losses in some districts have been severe, while in others the yield is poor, and the grain, both of wheat and linseed, is turning out light and of poor quality.

The area sown with maize exceeds that of any previous year, and with favourable weather the crop, both as regards quantity and quality, promises (at the date of writing) to be a record one.

Apple Production in the United States of America.—According to the *Daily Commercial News* (San Francisco) of November 30th, the total apple production of the United States in 1909 was 22,735,000 barrels, as compared with 25,450,000 barrels in 1908. Since 1906, in which year the crop was 38,280,000 barrels, the crop has decreased continuously, although more trees are in bearing now than then. (*Board of Trade Journal*, December 23rd, 1909.)

Bean Crop of North Manchuria.—The British Vice-Consul at Vladivostok reports, under date December 2nd, that the latest accounts of the North Manchurian bean crop are not very satisfactory. It would appear that the beans were adversely affected by the late rains, and are in consequence inferior in quality and size to those of the 1908 crop (*Board of Trade Journal*, January 13th, 1910.)

The Board of Agriculture and Fisheries have been furnished by the Board of Trade with the following report, based on returns from correspondents in various districts, on the demand for agricultural labour in January.

**Agricultural Labour
in England
during January.**

Agricultural employment was generally regular, but a few days were lost by day labourers in most districts through unfavourable weather. Owing to farm work being somewhat backward, the demand for this class of labour was fair for the time of the year; the supply, however, was as a rule sufficient.

Northern Counties.—Agricultural employment was in general fairly regular in *Northumberland*, where there were but few day labourers to be affected by the severe weather conditions which prevailed. Turnip pulling, manure carting, hedging, and threshing provided a certain amount of work for day labourers in *Cumberland*, *Westmorland*, and *Lancashire*, but generally the demand was reduced on account of bad weather, and nearly all correspondents refer to loss of time by this class of labourer. A correspondent states that many men failed to obtain engagements at the Carlisle and Cocker mouth quarterly hirings, and there was a reduction in wages; women servants, however, were in request. Outdoor employment was fairly good for the time of year in *Yorkshire* until the last week of the month, when snow caused considerable interruption; there was a full supply of day labourers, and in several districts the supply was in excess of the demand.

Midland Counties.—There was generally a fair demand for day labourers in *Cheshire*, and but few men were reported in irregular employment. A correspondent in the Tarvin union writes:—"Permanent situations are fairly well filled up now, and there are not many men suitable for these positions out of employment." Bad weather caused a few days to be lost by day labourers in *Derbyshire* and *Nottinghamshire*, but generally the supply of and demand for these men were reported as about equal. Similar reports came from *Leicestershire*. In *Staffordshire* and *Shropshire* there was only a moderate demand for day labourers, and many were reported in irregular work. Threshing, manure carting, and hedging provided a moderate amount of extra work in *Worcestershire*, but a correspondent states that more

men than usual were in irregular employment. The demand for day labourers in *Warwickshire* was fairly good until the end of the month, when it was affected by the severe weather. Threshing and other work provided fairly regular employment, also in *Northamptonshire*. There was a plentiful supply of labourers in both these counties. In *Oxfordshire* the supply was in excess of the demand in several districts, and there was some irregularity of employment among day labourers in consequence. A number of such men were reported to have lost time in *Buckinghamshire* on account of bad weather. In *Hertfordshire* and *Bedfordshire* several able-bodied men were reported in irregular work.

Eastern Counties.—Threshing and other work generally provided regular employment in *Huntingdonshire* and *Cambridgeshire*, and the supply of and demand for day labourers were about equal. Employment was regular on the whole in *Lincolnshire*, where there was more work than usual on account of the late corn harvest; correspondents in the Lincoln and Sleaford Unions mention a scarcity of extra men for threshing. Stormy weather somewhat interrupted outdoor work in *Norfolk* and *Suffolk* at the end of the month, but generally there was a fairly good demand for day labourers in these counties; the supply was sufficient, and in several districts there was a surplus. In *Essex* threshing, manure carting, hedging, &c., provided a fairly constant demand for day labourers, which was fully met by the supply.

Southern and South-Western Counties.—Some surplus of day labourers was reported in *Kent*, but the demand for this class of labour was fair for the time of year, and there was not much irregularity of employment until towards the end of the month, when severe weather hindered outdoor work. Threshing, manure carting, hedging and ditching provided a good deal of extra work in *Surrey* and *Sussex*, and the supply of and demand for day labourers were generally about equal; several correspondents in *Sussex* refer to the sodden state of the land as considerably hindering such operations as ploughing and carting. Some time was lost through bad weather by day labourers in *Hampshire*, there was a full supply of such men. Men for permanent situations were somewhat in excess of requirements in certain unions. Few day labourers were reported in irregular work in *Berkshire*. Threshing and other work provided some employment for day labourers in *Wiltshire*, but the demand suffered on account of continuous wet weather, and there was a surplus in the supply of day labourers. There was only a moderate demand for such men in *Dorset*. In *Somerset* most men of this class were reported in fairly regular employment. Bad weather interrupted outdoor work somewhat considerably in *Herefordshire*. There was a plentiful supply of day labourers in *Gloucestershire*, where a moderate amount of work was found at threshing, manure carting, hedging, and ditching. Day labourers in *Devon* and *Cornwall* were in fairly regular employment, though in these counties, as in most other districts, a few days were lost on account of wet weather.

THE CORN MARKETS IN JANUARY.

C. KAINS-JACKSON.

Sellers of grain have found the first month of the new year one of disappointment, for a weak demand has made it very difficult fully to maintain prices. There has been little actual change in quotations; but in mid-winter a certain buoyancy in the markets is expected, and the absence of this has created a feeling of more or less depression.

Wheat.—The price of British wheat in London has been a little higher than for January, 1909, but there was a duller feeling late in the month than at the beginning, and country holders found little encouragement to deliver up to town. Fine white wheat, however, made 40s. on the 31st, and sound red 38s., these prices being for the 504-lb. qr. Poultry corn realised 30s. to 32s. per 448 lb.

Foreign wheat has advanced a little for fine Manitoba; in a season when British is lacking in dry gluten, the Dominion product is particularly appreciated. Old crop Argentine and Australian have become scarce, and the supply of Russian has been much below that which the heavy shipments might have led one to expect. Most of the Russian export surplus seems to be required by Continental buyers.

Interest has mainly attached to the purchases of new crops. Australia has been getting 40s. 6d. for South Australian, 40s. 9d. for West Australian, 40s. 3d. for New South Wales—all 480 lb. for present month (February) shipment. Argentina has obtained 38s. 3d. for new Baruso, 40s. 9d. for old Rosario, 40s. for new Rosario—prompt shipment, per 480 lb. These operations in new crops, conducted while the actual harvests were proceeding, may in some respects be classed as "futures," but they differ essentially from what is called "the speculative trade" in being purchases of which actual delivery is required to supply milling wants. Many millers, in fact, now buy direct. The market is not particularly depressed by news of a big crop in Australia, for the deficiency in Argentina is admittedly serious, and likely to balance the increase in our own Colonial surplus.

At the end of the month, 2,500,000 qr. were on passage, against 2,200,000 qr. at the middle and 1,900,000 at the beginning; stocks of foreign wheat in the chief ports were estimated to have increased from 1,200,000 to 1,560,000 qr. during the month. These figures largely explain buyers waiting in hopes of lower prices. Shipments included 1,189,000 qr. from North America, 362,000 qr. from South America, 2,386,000 qr. from Russia, 244,000 qr. from "Europe, S.E.," 281,000 qr. from India, and 943,000 qr. from Australia. The Australian shipments are nearly all for the United Kingdom.

Flour.—The month has passed without any change in the top price of flour, but on the 31st 30s. was accepted for ordinary household grade, which had previously made 30s. 6d. Country flour sustained a corresponding decline, and even then sales were slow. Canadian flour at 30s. to 31s. has commanded a fair sale, and there has been some buying of best Minneapolis at 31s. 6d., best Hungarian at 48s. 6d., and Australian (from old crop wheat) at 32s. per sack. American shipments were 685,000 sacks, and 240,000 sacks are stated to be on passage.

Barley.—This trade has been discouraging in London, and it has not been much better at the rural markets. The weather has not

favoured threshings, and the grain secured in the autumn, very slowly and after much exposure, is too often found to be below brewing use, and not much welcomed even by distillers. The mean price at Mark Lane has been about 2s. 8d. lower than a year ago.

The month's shipments were 83,000 qr. from California, 851,000 from Russia, and 171,000 from Europe S.E. The quantity on passage was 540,000 qr. on New Year's Day, and 440,000 at the close of the month. The statistical position should encourage holders, and foreign sorts are in fact held with considerable firmness.

Oats.—The country markets have quoted some very low averages—16s. 1d. at a great agricultural centre like Colchester is a case in point. Mark Lane has kept its name as a high quality market, but business did not at any single market reach a full level of winter briskness.

Foreign oats have been a steady trade at 16s. to 16s. 6d. for ordinary 304 lb. kinds. La Plata has been offering new crop for February shipment at 15s. 3d., and a considerable "forward" business has been done. There were 272,000 qr. shipped during January from the River Plate, and 930,000 qr. from Russia. The supply on passage rose to 400,000 qr.

Maize.—An important survey of the world's production of this staple appears in *Dornbusch's Shipping List* of the 28th January. The total is put at over 421 million quarters and buyers should, in theory, have the best of the market. As a matter of fact, maize has been firm where most other staples have lacked strength, and at the end of the month London quoted 27s. for Odessa, 28s. Buenos Aires, 27s. 3d. Durban and 27s. 3d. Baltimore; Liverpool, 5s. 8d. New American, 5s. 10d. old Argentine, and 5s. 9d. new Russian. London prices are per 480 lb., Liverpool per 100 lb. Argentina at the close of the month was selling new crop for May shipment at 26s. 6d. per 480 lb., and the fact that there were free takers at this price argued no belief in maize being really cheap this year.

Shipments were 837,000 qr. from North America, 283,000 South America, 338,000 Russia, and 430,000 "Europe S.E." There was a decline in the quantity on passage from 690,000 qr. to 540,000 qr., and America thus far has held her new crop with much stiffness.

Oilseeds.—The price of linseed has remained high, and on the 31st London quoted Indian at 60s. per 410 lb., Argentine at 58s. per 416 lb. Prices for June delivery of new Indian, and for March delivery of new Argentine, were 54s. 9d. and 56s. respectively. The first half of 1910, therefore, is promised a price range of 55s. to 60s., with 57s. 6d. as an average. This quotation is viewed with apprehension by those who need large quantities for expressing oil or making cake.

Oilcake.—The best London-made linseed cake on New Year's Day was quoted at 9s. 6d. to 9s. 9d. per cwt. cash *ex mill*, while on the 31st January 9s. 3d. was accepted. This abatement of previous stringency is welcome, but anything over 9s. is a serious matter for those with animals to fatten or even keep in level condition over winter. Russian linseed cake is no cheaper on the month, and America on the 31st reported a rising market. Russian is mostly held for 9s., with 8s. 11d. per cwt. sometimes accepted. Egyptian cottonseed cake at Hull has declined from £6 5s. to £6 2s. 6d. per ton on the month; the London price is unchanged—£6 2s. 6d. per ton. Trade is slow.

Soy bean cake had an initial quotation of £7 2s. 6d. per ton, and closed at £7. For June delivery £6 13s. 9d. would not, we understand, be refused.

Various Feeding Stuffs.—Beet sugar, which in 1900-1 stood at 8s. 7d. per cwt., fetched 12s. 6d. at the beginning of this year, and was quoted at 12s. 10d. on 31st January. Despite this steady tendency to appreciate, the demand for feeding purposes remains good. Feeding rice has fallen 1d. per cwt. on the month, but closed with a fair sale at the terms demanded. Soy beans have been steady at 7s. 7d. per cental. Chinese are cheaper: 32s. per 480 lb., washed. China is also sending us cheap peas at 6s. 5d. per cental. Bran, sharps and middlings, have been rather easier to buy on the month, and currencies ruling are fairly moderate for the time of year. Lentils have come down in price, and at 32s. per 504 lb. command a somewhat increased attention. Those who prefer to buy pulse already split, are paying 10s. 6d. per cental for lentils, 10s. per cental for peas, and 11s. per 160 lb. bag for beans in that state for use.

THE LIVE AND DEAD MEAT TRADE IN JANUARY.

A. T. MATTHEWS.

Fat Cattle.—The new year began with a scarcity of first quality animals, and trade was firm for any cattle in fair butchering condition. Prices showed a tendency to revert to the level of those prevailing before the special Christmas markets. Shorthorns began with an average of 8s. 2½d. in 22 English markets, showing no advance, but second quality did better by 1½d. per stone, a feature of the trade which, in itself, pointed to the existence of a keen demand. All through the month there was a remarkable steadiness, with only here and there a weak market, while prices gradually hardened week by week. By the end of the month Shorthorns of first quality attained a general average of 8s. 4½d. per stone, and second quality 7s. 7½d. There is always an excellent supply of Norfolk-fed Irish Shorthorns in the London market in January, and these are so well fed and of such handy weights that in the absence of Aberdeen Angus, direct from Scotland, which only put in an occasional appearance, they fetch more than anything else in the market. On the 25th at Ipswich they made the extreme price of 9s. 6d. per stone for a few particularly choice specimens, and at Islington on the 24th large numbers realised 9s. On that day there happened to be a few capital Aberdeens direct from their native county, and these were quoted at 9s. 4d., or only about ½d. per lb. more than the Norfolks. In all the markets officially quoted the same week for "Polled Scots," a term which includes many animals far inferior to the genuine Aberdeens, the general average was 8s. 7½d., or 2½d. per stone more than Shorthorns. The prices realised for Devons and Herefords in January were comparatively low. They were shown in small numbers, and at Islington only second quality Herefords were present.

Veal Calves.—There was a good steady demand for fat calves throughout the month, with very little variation in the average price.

The best quality have ruled from 8½d. to 8½d. per lb., but values were uneven as regards the different markets, of which about 20 are noted in the official weekly reports. In the last week 10d. per lb. was obtained at Preston, and 9d. at Chichester, Derby, Salford, and Edinburgh.

Fat Sheep.—The slight improvement in the sheep trade which began to manifest itself about Christmas made a distinct and gratifying advance during January. A far more cheerful tone pervaded the markets, with an obviously increased demand. The average price of prime Downs went steadily upwards till in the last week it stood at 8½d. per lb. in 17 English markets. This was a recovery of 1½d. per lb. from the lowest point touched during the depression, and means about 6s. 6d. per head more on sheep of moderate weight. In fact, second quality sheep made fully as much money as the first were worth a few months ago. The last quotations of the latter averaged 7½d. per lb., while ewes showed a total advance of 1½d. from the lowest point. Sheep classed as Longwools showed about the same advance, and their first quality reached an average of 7½d. by the end of the month.

Besides the better demand which was shown all over the country it should be borne in mind that other causes have combined to appreciate values since Christmas. The markets have been well supplied with fine young tegs of good quality and moderate weight, and the value of the skins has been much higher. Tegs are now carrying nearly their full weight of wool, and, with a good trade for that article, skins are worth something like 10s. each for good "cross-breds."

Fat Pigs.—With a continued scarcity of fat pigs, although there was a slight occasional check to further advance, there was a brisk trade in the last week and prices were as high as ever. The last quotations showed averages for first quality of 7s. 9d. per stone and 7s. 1½d. for second.

Carcass Beef—British.—Trade was adversely influenced at first by the extreme mildness of the weather and the fact that holders had failed to clear out their Christmas supplies, of which there was a considerable surplus. Still, there were only small fluctuations in the value of native beef. Scotch whole sides ruled from 6½d. to 6½d. for best quality, while the few English sides in London markets occasionally made 6d. per lb. Of these, however, the bulk were of second quality only and were worth about 5½d. The quality of the Scotch generally was below the usual average.

Port-Killed Beef.—The supplies of American port-killed beef were moderate, and much of it was of second quality, or what is usually called "Rancher" beef. This class was largely sold at 5d. per lb., but the best quality fetched 6d. and, exceptionally, 6½d. per lb.

Chilled Beef.—There were the usual sharp variations in the value of chilled beef, but on the whole the trade was slow. At the beginning of the month very good Argentine was making 3½d. for hindquarters, and American 5d. to 6d. per lb. In the last week Argentine hind-quarters were making 4½d. to 4½d. and American 5½d. to 6½d., and best forequarters about 4d. per lb.

Frozen Beef.—Frozen was in poor demand and prices varied little from 3½d. per lb. for best hindquarters, and 2½d. for best forequarters.

Carcass Mutton—Fresh Killed.—In sympathy with the live markets, British mutton advanced, but only slightly so till towards the end of the

month. Prime Scotch, which began at $6\frac{1}{2}d.$, left off at $7\frac{1}{2}d.$, and West Country English teds advanced about $\frac{1}{2}d.$ per lb., making $6\frac{1}{2}d.$ at the finish. The season for Dutch mutton was nearly over.

Frozen Mutton.—This trade was very quiet. Stocks in cold storage are heavy and prices showed little change.

Veal.—The trade for veal was very uneven and fluctuated considerably from week to week. The best quality ranged from $7\frac{1}{2}d.$ to $8\frac{1}{2}d.$ per lb., leaving off at the latter high figure in London.

Pork.—A very firm trade all the month with moderate supplies, and prices ranging between $7d.$ and $7\frac{1}{2}d.$ for best quality, with an occasional $8d.$ for prime dairy-fed.

THE PROVISION TRADE IN JANUARY.

HEDLEY STEVENS.

Bacon.—Arrivals have continued small, and trade for the entire month has been slow, but in spite of the poor demand prices have remained high, the curtailed consumption being more than sufficient to prevent any accumulation of stocks on hand. The arrivals from Denmark have been below the average, but have not cleared readily. At the end of the month the heavy snowstorms in that country interfered with the arrival of pigs at the factories, as well as the shipments of cured meat, so the quantities arriving will be still further reduced. Canadian bacon has reached us in slightly increased quantities, but there still exists in that country a shortage in the supply of hogs, with high prices; and consequently the curers report that the prices realised in England on the cured product are still unremunerative.

The abnormal conditions continue in the United States of America. During the second week of the month the top price of hogs reached \$9.05, which is reported to be the highest price for thirty years. The same week last year the top price was \$6.30, and \$4.55 two years ago, or about half the present cost of raw material. Stocks on hand in the American packing houses are said to be 50 per cent. less than last year, when they were also small for the winter season. As a consequence, arrivals into this country from America have been very short, but more than sufficient to fill all requirements. Packers report that they cannot replace present stocks except at several shillings per hundredweight advance. The recent boycott in the United States of fresh beef, so as to force down prices, has had a bearish effect on hog products, and hogs are slightly cheaper, but it is thought that the effect will be only of a temporary nature. Private cables received at the end of the month advise that the American Government Bureau reports a shortage of $6\frac{1}{2}$ million hogs, as compared with twelve months ago.

Arrivals of bacon from Russia show an increase, and the quality is reported to have improved. This is taking the place of American, especially amongst dealers usually handling American singed sides.

English pigs continue to advance in price on account of scarcity, and curers say that they cannot secure a corresponding advance from their customers. Killings in Ireland have also been small for the month.

Butter.—The month opened with a moderate trade at steady prices,

and with large shipments on passage from New Zealand and Australia, it was anticipated that there would be a steady "hand to mouth" business, with little, if any, change in prices. At the end of the month, encouraged by the smaller arrivals from the Continent, and the stored stocks which were below the average, some large operators manipulated the market. By storing large quantities for future use and removing them from the market, they managed to lift spot prices from 8s. to 12s. per cwt., making top prices around 124s., as against 112s. last year. It is thought that these prices cannot be maintained, as large weekly arrivals will reach us during February, and buyers act very cautiously. The weather in the Colonies has continued favourable for a large make.

There have been no arrivals from Canada or the United States. In the latter country, equal to 166s. c.i.f. is being made for fancy selections, which is slightly cheaper than last month.

Cheese.—The demand was very slow at the commencement of the month, but the arrivals from New Zealand, although large, cleared up more quickly than was anticipated, and prices early began to harden. By the end of the month Canadian had advanced 3s. to 4s., and New Zealand 2s. to 3s. At the advanced prices both descriptions were 2s. to 3s. under top prices current during January of last year.

This improvement on spot has led to some enquiries being cabled for goods stored in Canada, resulting in orders being put through at 1s. to 3s. advance on the figures asked for the same lots, for shipment during December. Shippers report that at this advance there is little, if any, profit for those who speculated in the "fall makes," and held them during the winter months, after allowing for storage charges, interest on money, and shrinkage in weight. On account of the undue competition between shippers and dealers to secure cheese from the factorymen, it has been a year of high prices, resulting in another very satisfactory year's trading for the farmer. Stocks in Canada are said to be much below those held at the same time last year.

Prices for cheese in the United States of America remain exceptionally high, fancy descriptions realising equal to 83s. c.i.f., and late makes 76s. to 80s. per hundredweight. The total shipments from New York, from May 1st, 1909, to January 19th, 1910, amount to only 21,617 boxes, as against 92,739 boxes for the same period last year. At the end of the month the estimated stocks of Canadian cheese at the three principal distributing centres (London, Liverpool, and Bristol) were 245,000 boxes, against 261,000 last year, and 253,000 two years ago.

English cheese has been in fair demand, and stocks have been considerably reduced all round. Prices do not show much fluctuation.

Eggs.—On account of the mild weather during January more new laid eggs were available, and prices were easier. Holders of eggs in cold storage tried to force business, with the result that there was a general slump in prices of all descriptions. At end of month there was some improvement, and prices were a little firmer. Last year at the same time all descriptions of eggs were scarce. Canadian advices at end of month report mild weather and increased supplies of new laid, which were selling at 38 to 40 cents per doz.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and SCOTLAND
in the Month of January, 1910.

(Compiled from Reports received from the Board's Market
Reporters.)

Description.	ENGLAND.		SCOTLAND.	
	First Quality.	Second Quality.	First Quality.	Second Quality.
FAT STOCK:—	per stone.*	per stone.*	per cwt.†	per cwt.†
Cattle:—	s. d.	s. d.	s. d.	s. d.
Polled Scots	8 6	8 0	40 6	37 0
Herefords	8 4	7 10	—	—
Shorthorns	8 3	7 7	39 4	36 3
Devons	8 5	7 8	—	—
	per lb.*	per lb.*	per lb.*	per lb.*
	d.	d.	d.	d.
Veal Calves	8½	7½	8½	6½
Sheep:—				
Downs	7½	7	—	—
Longwools	7½	6½	—	—
Cheviots	8½	7½	7½	6½
Blackfaced	7½	6½	7½	6½
Cross-breds	8	7	8	6½
	per stone.*	per stone.*	per stone.*	per stone.*
	s. d.	s. d.	s. d.	s. d.
Pigs:—				
Bacon Pigs	7 8	7 2	7 9	6 9
Porkers	8 4	7 9	8 2	7 2
LEAN STOCK:—	per head.	per head.	per head.	per head.
Milking Cows:—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk ...	22 2	18 5	22 6	18 1
„ —Calvers... ..	21 7	17 19	20 4	17 1
Other Breeds—In Milk ...	21 5	16 14	19 2	16 4
„ —Calvers	14 10	12 0	19 1	16 2
Calves for Rearing	2 6	1 13	2 13	1 18
Store Cattle:—				
Shorthorns—Yearlings ...	10 3	8 13	9 12	8 1
„ —Two-year-olds ..	14 1	11 17	14 12	11 19
„ —Three-year-olds ...	17 0	14 10	16 18	15 10
Polled Scots—Two-year-olds	—	—	16 3	13 8
Herefords— „	14 14	13 13	—	—
Devons— „	14 2	12 6	—	—
Store Sheep:—				
Hoggs, Hoggets, Togs, and Lambs—	s. d.	s. d.	s. d.	s. d.
Downs or Longwools ...	36 11	30 9	—	—
Scotch Cross-breds ...	—	—	23 10	20 0
Store Pigs:—				
Under 4 months	27 2	20 4	21 1	16 8

* Estimated carcass weight.

† Live weight.

**AVERAGE PRICES of DEAD MEAT at certain MARKETS in
ENGLAND and SCOTLAND in the Month of January, 1910.**

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Quality.	London.	Birming- ham.	Man- chester.	Liver- pool.	Glas- gow.	Edin- burgh.
		per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
BEEF :—		<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
English	1st	55 6	54 0	52 6	—	60 0*	57 0*
	2nd	53 6	50 6	48 6	—	53 0*	50 6*
Cow and Bull ..	1st	39 0	47 0	45 0	43 0	46 0	43 6
	2nd	32 6	41 0	39 6	37 6	34 0	38 6
U.S.A. and Cana- dian :—							
Port Killed ...	1st	55 6	52 0	51 6	52 6	51 6	—
	2nd	48 0	46 0	47 0	47 0	42 6	—
Argentine Frozen—							
Hind Quarters ..	1st	29 6	31 0	31 0	31 0	30 6	32 0
Fore " ...	1st	25 6	27 0	26 0	26 0	25 6	27 0
Argentine Chilled—							
Hind Quarters...	1st	41 6	41 6	40 0	40 0	40 0	41 0
Fore " ...	1st	29 6	30 6	29 0	30 6	31 0	30 0
American Chilled—							
Hind Quarters—	1st	58 5	56 0	56 0	56 0	—	58 0
Fore " ...	1st	36 0	37 6	37 6	37 6	—	38 6
VEAL :—							
British	1st	73 6	64 0	74 6	79 6	—	70 0
	2nd	67 6	55 0	69 0	72 6	—	—
Foreign	1st	73 6	—	65 6	70 6	—	64 6
MUTTON :—							
Scotch	1st	61 0	60 0	66 0	66 0	61 0	55 6
	2nd	58 6	53 0	60 6	61 0	49 6	46 0
English	1st	57 6	60 6	63 0	61 0	—	—
	2nd	53 6	55 0	58 6	56 0	—	—
Argentine Frozen ...	1st	34 0	34 6	34 6	34 0	31 6	33 6
Australian " ...	1st	32 0	32 6	33 0	31 6	31 6	32 6
New Zealand " ...	1st	38 0	—	—	—	—	—
LAMB :—							
British	1st	—	—	—	—	—	—
	2nd	—	—	—	—	—	—
New Zealand ...	1st	45 0	43 6	39 6	39 6	46 6	—
Australian ...	1st	38 0	40 0	35 0	35 6	36 0	—
Argentine ...	1st	38 6	37 6	35 0	35 6	36 0	37 6
PORK :—							
British	1st	68 0	71 0	75 0	74 0	65 6	66 6
	and	63 6	63 6	70 6	69 0	60 6	57 6
Foreign	1st	66 6	—	—	—	—	—

Scotch.

AVERAGE PRICES of British Corn per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1908, 1909 and 1910.

Weeks ended (1st 1910)	WHEAT.						BARLEY.						OATS.					
	1908.		1909.		1910.		1908.		1909.		1910.		1908.		1909.		1910.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Jan. 1 ...	35	1	32	0	33	3	26	9	26	7	25	1	18	4	17	4	17	4
" 8 ...	35	2	32	9	33	6	26	9	26	11	24	11	18	3	17	5	17	2
" 15 ...	35	5	32	8	33	8	27	1	27	1	24	11	18	5	17	5	17	7
" 22 ...	35	6	33	2	33	9	26	11	27	3	24	11	18	5	17	8	17	6
" 29 ...	35	0	33	0	33	6	26	11	27	6	25	0	18	4	17	9	17	4
Feb. 5 ...	34	3	33	4	33	7	26	9	27	7	24	10	18	3	17	10	17	7
" 12 ...	33	1	33	8			26	9	27	8			18	0	17	11		
" 19 ...	32	6	34	1			26	5	27	11			17	11	18	0		
" 26 ...	30	11	34	5			26	3	28	0			17	8	18	0		
Mar. 5 ...	30	5	34	10			26	1	27	11			17	8	18	2		
" 12 ...	31	3	35	8			26	0	28	4			17	10	18	2		
" 19 ...	31	7	35	9			26	2	28	0			17	11	18	5		
" 26 ...	31	4	36	0			25	10	28	0			17	10	18	6		
Apl. 2 ...	31	3	36	5			25	5	27	10			17	9	18	8		
" 9 ...	31	2	37	4			25	10	28	0			17	7	18	10		
" 16 ...	30	11	38	7			26	1	27	8			17	7	19	2		
" 23 ...	30	10	41	4			25	5	28	2			17	9	19	9		
" 30 ...	31	6	42	5			25	8	27	10			18	0	20	0		
May 7 ...	32	4	40	9			25	5	27	7			18	4	20	3		
" 14 ...	33	1	41	6			24	9	27	3			18	7	20	6		
" 21 ...	33	8	42	8			25	9	27	0			18	10	20	11		
" 28 ...	33	5	42	6			24	6	26	3			18	8	21	0		
June 4 ...	33	1	43	1			25	10	25	7			18	4	21	3		
" 11 ...	32	7	42	11			24	5	26	10			18	4	21	4		
" 18 ...	32	0	42	7			24	2	26	10			18	5	21	6		
" 25 ...	31	5	42	8			24	0	27	2			18	7	21	7		
July 2 ...	30	11	42	9			23	11	27	2			18	7	21	9		
" 9 ...	30	5	43	0			24	4	26	4			18	5	21	8		
" 16 ...	30	7	43	3			23	1	26	10			18	5	21	9		
" 23 ...	31	5	44	0			26	5	27	4			18	6	22	5		
" 30 ...	31	10	43	5			24	4	24	6			18	7	22	2		
Aug. 6 ...	31	6	44	9			23	1	27	4			18	9	22	11		
" 13 ...	31	6	44	9			23	10	24	9			18	1	21	8		
" 20 ...	31	2	41	6			24	5	23	11			17	10	19	8		
" 27 ...	30	10	38	5			24	5	24	7			17	1	19	4		
Sept. 3 ...	30	10	37	2			23	5	26	3			17	3	19	6		
" 10 ...	31	5	34	11			23	11	26	1			17	6	18	5		
" 17 ...	31	7	33	6			26	0	26	5			17	3	17	9		
" 24 ...	31	5	32	9			26	8	26	8			17	2	17	7		
Oct. 1 ...	31	7	32	2			26	11	26	9			17	2	17	2		
" 8 ...	31	5	31	8			27	5	26	9			17	0	17	0		
" 15 ...	31	2	31	4			27	6	27	0			17	0	17	0		
" 22 ...	30	11	31	8			27	5	27	7			16	11	16	11		
" 29 ...	30	8	31	10			27	5	27	9			16	11	17	0		
Nov. 5 ...	30	11	32	5			27	6	27	9			17	0	17	0		
" 12 ...	31	2	32	5			27	4	27	7			17	0	17	1		
" 19 ...	31	10	32	7			27	3	27	0			17	3	17	4		
" 26 ...	32	3	33	0			27	2	26	8			17	5	17	3		
Dec. 3 ...	32	7	33	3			27	2	26	1			17	4	17	4		
" 10 ...	32	8	33	3			27	0	25	7			17	4	17	3		
" 17 ...	32	9	33	2			26	9	25	3			17	3	17	4		
" 24 ...	32	2	33	1			26	8	25	2			17	2	17	4		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lbs.; Barley, 50 lbs.; Oats, 39 lbs. per Imperial Bushel.

AVERAGE PRICES of Wheat, Barley, and Oats per Imperial Quarter in FRANCE, BELGIUM, and GERMANY, and at PARIS, BERLIN, and Breslau.

	WHEAT.		BARLEY.		OATS.	
	1909.	1910.	1909.	1910.	1909.	1910.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
France : January	38 0	40 2	25 10	25 8	20 1	21 0
Paris : January	39 3	42 0	23 3	24 8	20 5	20 8
	1908.	1909.	1908.	1909.	1908.	1909.
Belgium : November	33 8	36 4	25 1	23 9	19 11	19 6
December	32 4	35 7	25 7	23 7	19 7	19 5
Germany : October	42 1	44 1	31 1	27 6	22 2	21 2
November	41 10	43 7	31 0	27 5	21 11	21 0
Berlin : October	43 10	47 2	—	—	22 11	21 3
November	44 3	46 8	—	—	23 0	21 7
Breslau : October	41 3	44 10	30 8 (brewing)	27 2 (brewing)	21 1	20 4
			26 0 (other)	25 1 (other)		
			31 6 (brewing)	27 2 (brewing)		
November	40 11	44 1	26 0 (other)	25 1 (other)	21 1	20 4

NOTE.—The prices of grain in France have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*; the Belgian quotations are the official monthly averages published in the *Moniteur Belge*; the German quotations are taken from the *Deutscher Reichsanzeiger*, the prices for the German Empire representing the average of the prices at a number of markets.

AVERAGE PRICES of British Wheat, Barley, and Oats at certain Markets during the Month of January, 1909 and 1910.

	WHEAT.		BARLEY.		OATS.	
	1909.	1910.	1909.	1910.	1909.	1910.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
London... ..	34 0	34 6	26 11	24 3	18 7	18 4
Norwich	31 10	33 2	26 1	23 7	17 2	17 3
Peterborough	32 2	32 9	26 4	24 11	17 2	16 10
Lincoln... ..	32 7	33 5	27 11	25 9	17 1	17 0
Doncaster	32 2	33 6	27 11	26 1	17 2	17 2
Salisbury	32 8	33 9	28 1	25 5	17 5	17 3

**AVERAGE PRICES of PROVISIONS, POTATOES, and HAY at certain
MARKETS in ENGLAND and SCOTLAND in the Month of
January, 1910.**

(Compiled from Reports received from the Board's Market Reporters.)

Description.	London.		Bristol.		Liverpool.		Glasgow.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
BUTTER :—	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British ..	17 0	15 0	15 0	14 0	—	—	15 0	—
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery	114 0	112 0	112 0	110 0	—	—	—	—
„ Factory	104 0	100 0	107 0	104 6	104 6	98 6	—	—
Danish ...	123 6	121 6	—	—	123 6	121 6	121 6	—
Russian ...	109 6	107 6	112 0	104 0	—	—	110 6	106 6
Australian ...	111 6	109 6	114 0	109 0	111 6	110 0	113 6	110 0
New Zealand	114 6	111 6	116 0	113 0	115 6	113 0	116 0	—
Argentine ...	111 0	109 0	115 6	112 6	112 0	110 6	112 6	—
CHEESE :—								
British—								
Cheddar ...	84 0	70 0	74 0	61 0	74 0	72 0	65 6	58 0
	120 lb.	120 lb.	—	—	120 lb.	120 lb.	—	—
Cheshire ..	88 0	77 6	—	—	81 6	72 0	—	—
	per cwt.	per cwt.			per cwt.	per cwt.		
Canadian ...	59 0	58 0	59 0	57 0	58 6	57 0	59 0	56 6
BACON :—								
Irish ...	72 6	70 6	73 0	69 0	72 6	69 0	76 6	73 6
Canadian ...	67 0	—	67 0	64 6	66 6	63 6	69 6	68 6
HAMS :—								
Cumberland ..	107 6	99 6	—	—	—	—	—	—
Irish ...	106 6	98 6	—	—	—	—	92 0	80 0
American (long cut) ...	66 0	—	67 0	63 6	66 6	62 0	67 6	65 0
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British ...	14 9	13 6	15 0	—	—	—	—	—
Irish ...	14 4	12 3	13 4	12 5	12 10	12 3	12 7	11 3
Danish ...	14 7	11 4	—	—	14 6	13 0	12 10	11 8
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Langworthy...	80 0	72 6	75 0	65 0	81 6	75 0	70 0	65 0
Scottish								
Triumph	71 0	57 6	70 0	60 0	53 6	50 0	—	—
Up to Date ...	71 0	57 6	75 0	65 0	53 6	50 0	66 6	61 6
HAY :—								
Clover ...	103 0	78 0	90 0	75 0	102 6	70 0	83 6	78 6
Meadow	94 6	72 0	75 0	60 0	—	—	80 0	76 6

DISEASES OF ANIMALS ACTS, 1894 to 1909.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

DISEASE.	JANUARY.	
	1910.	1909.
Swine-Fever :—		
Outbreaks	102	158
Swine Slaughtered as diseased or exposed to infection ...	690	1,043
Anthrax :—		
Outbreaks	155	139
Animals attacked	184	175
Foot-and-Mouth Disease :—		
Outbreaks	—	—
Animals attacked	—	—
Glanders (including Farcy) :—		
Outbreaks	34	45
Animals attacked	97	96
Sheep-Scab :—		
Outbreaks	160	190

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

DISEASE.	JANUARY.	
	1910.	1909.
Swine-Fever :—		
Outbreaks	5	3
Swine Slaughtered as diseased or exposed to infection ...	154	12
Anthrax :—		
Outbreaks	2	1
Animals attacked	2	1
Sheep-Scab :		
Outbreaks	116	85

ADDITIONS TO THE LIBRARY.

[NOTE.—The receipt of annual publications of foreign agricultural and other departments, experiment stations, and societies is not noted in the monthly list of additions to the Library. A list of these publications appeared in the *Journal* for October, November, and December, 1909.]

Plant Diseases—

Pagenstecher, Dr. A.—Die geographische Verbreitung der Schmetterlinge. (451 pp.) Jena: Gustav Fischer, 1909. 11 marks.

Smith, J. B.—Our Insect Friends and Enemies. (314 pp.) Philadelphia and London: J. B. Lippincott Company, 1909. \$1.50 net.

Swanton, E. W.—Fungi, and How to Know Them. (210 pp.) London: Methuen and Co., 1909. 6s. net.

U.S. Department of Agriculture, Bureau of Entomology.—Circ. 112.—Control of the Mediterranean Flour Moth by Hydrocyanic-Acid Gas Fumigation. (22 pp.) Circ. 113.—The Chinch Bug. (27 pp.) Circ. 114.—The Euonymus Scale. (5 pp.) Bull. 58, Part IV.—Some Insects Injurious to Forests. The Southern Pine Sawyer (26 pp.) Part V.—Some Insects Injurious to Forests. Insect Depredations in North American Forests, and Practical Methods of Prevention and Control. (45 pp.) Bull. 82, Part 2.—Some Insects Injurious to Truck Crops.—The Parsnip Leaf-Miner, the Paisley Stalk Weevil, the Celery Caterpillar. (24 pp.) Bull. 82, Part 3.—The Lima Bean Pod-Borer. The Yellow-Necked Flea-Beetle. (32 pp.) Bull. 85, Part 1.—The Lesser Clover-Leaf Weevil. (12 pp.) Bull. 85, Part 2.—The Slender Seed-Corn Ground-Beetle. (28 pp.) Technical Series, No. 16, Part 3.—Catalogue of Recently Described Coccidæ.—II. (Pp. 33–60.) Washington, 1909.

Hultner, L.—Pflanzenschutz nach Monaten geordnet (433 pp.) Stuttgart: E. Ulmer, 1909. 4 50 M.

Worcestershire County Council, Education Committee.—First and Second Reports on the Experimental Spraying for the Apple Sucker (*Psylla mali*), with Notes on the Mussel Scale, Red Spider, and Brown Rot. (26+31 pp and plates.)

Hampson, Sir G. F.—Catalogue of the Lepidoptera Phalaenæ in the British Museum, Vol. VII (709 pp and plates.) Vol. VIII. (583 pp. and plates.) London: Longmans and Co., 1909

Smith, G., and others.—Crustacea and Arachnids. (Cambridge Natural History, Vol. IV.) (566 pp.) London: Macmillan and Co., Ltd., 1909. 17s. net.

Department of Agriculture, Canada, Central Experimental Farm, Division of Botany.—Bull. No. 63.—A Serious Potato Disease Occurring in Newfoundland. (8 pp. and plates.) Ottawa, 1909.

Bos, Dr. J. Ritsema.—Tierische Schädlinge und Nutzlinge für Ackerbau, &c. (876 pp.) Berlin: Paul Parey, 1891.

Live Stock—

Kansas State Agricultural College, Experiment Station.—Circ. No. 4.—Prairie Dog Situation. (7 pp.) Manhattan, 1909.

Oettingen, B. von.—Horse Breeding in Theory and Practice. (469 pp.)

• London: Sampson, Low, Marston and Co., 1909. 42s. net.

Smetham, A.—Some New Feeding Stuffs and their Relative Value as Cattle Foods. (20 pp.) (Reprinted from the *Journal of Royal Lancashire Agricultural Society*, 1909.) Liverpool: J. Mawdsley and Son, 1909.

Tybbels, E. C.—Utility Rabbits. (36 pp.) London: Dawbarn and Ward, Ltd. 6d.

University of Illinois, Agricultural Experiment Station.—Circular No. 133 :—Feeding the Pig. (19 pp.) Urbana, Illinois, 1909.

Department of Agriculture, Canada, Branch of the Live Stock Commissioner.—Special Report on the Cattle Trade of Western Canada. (23 pp.) Ottawa, 1909.

Dairying—

Virginia Agricultural Experiment Station.—Bull. 185 :—The Production of Clean and Sanitary Milk. (22 pp.) Blacksburg, Virginia, 1909.

Canada, Laboratory of the Inland Revenue Department.—Bull. 189 :—Cream. (9 pp.) Bull. 190 :—Ice Cream. (14 pp.) Ottawa, 1909.

Durham County Council, Education Committee.—Reports on Dairy Investigations at Offerton Hall. (146 pp.) Newcastle-on-Tyne : Andrew Reid and Co., 1909. 6d.

Mayall, G.—Cows, Cow-Houses, and Milk. (99 pp.) London : Baillière, Tindall and Cox, 1909. 2s. 6d. net.

University of Illinois Agricultural Experiment Station.—Circular 131 :—Handling of Cream and Making of Butter on the Farm. (10 pp.) Bulletin 137 :—A Study of Factors Influencing the Composition of Butter. (52 pp.) Bulletin 140 :—Dairy Suggestions from European Conditions as Seen in the British Isles, Holland and Denmark. (62 pp.) Urbana, Illinois, 1909.

Somerset County Council.—Investigations Relative to the Composition of Milk. (20 pp.) Bath, 1909.

The University of Leeds and the Yorkshire Council for Agricultural Education.—Bull. 77 :—Studies Connected with the Manufacture of Early Season Cheeses. (15 pp.) Leeds, 1910.

Veterinary Science—

Osborne, W. A.—The Elements of Animal Physiology. (152 pp.) Melbourne : T. C. Lothian, 1909. 6s.

U.S. Department of Agriculture, Bureau of Animal Industry.—Circ. 68 (revised) :—Diseases of the Stomach and Bowels of Cattle. (14 pp.) Bull. 39 :—Index Catalogue of Medical and Veterinary Zoology, Part 24 (1807-1893 pp.) ; Part 25 (1894-1979 pp.) Bull. 121 :—The Need of Controlling and Standardising the Manufacture of Veterinary Tetanus Antitoxin. (22 pp.) Washington, 1909.

North Dakota Agricultural Experiment Station.—Bull. 85 :—Glanders. (75 pp.+6 plates.) Fargo, North Dakota, 1909.

U.S. Department of Agriculture.—Farmers' Bulletins. No. 378 :—Methods of Exterminating the Texas-Fever Tick. (30 pp.) No. 379 :—Hog Cholera. (23 pp.) No. 380 :—The Loco-Weed Disease. (16 pp.) No. 381 :—Experiment Station Work, LIV. (32 pp.) Washington, 1909.

Birds, Poultry and Bees—

Department of Agriculture, New South Wales.—7th Annual International Egg Laying Competition, Hawkesbury Agricultural College. (18 pp.) 1909.

Shipley, A. E.—The Ectoparasites of the Red Grouse (*Lagopus Scoticus*). (309-334 pp.+plates.) The Thread-Worms (*Nematoda*) of the Red Grouse. (335-350 pp.+plates.) The Tape-Worms (*Cestoda*) of the Red Grouse. (351-363 pp.+plates.) Internal Parasites of Birds Allied to the Grouse. (364-368 pp.) (*From the Proceedings of the Zoological Society of London.*) 1909.

Brown, J. T.—Encyclopædia of Poultry.* 2 vols. (513 pp.+plates.) London : Southwood and Co., 1909. 25s. net (*édition de luxe*); 10s. 6d. net (popular edition).

Wagner'sche Sammlung von Gesetzen und Verordnungen für das Land Vorarlberg.—Gesetz betreffend den Schutz der für die Bodenkultur nützlichen Vögel von Vorarlberg. (26 pp.) Innsbruck, 1909.

Aberdeen and North of Scotland College of Agriculture.—Bull. 12 :—Report on the Use of Virus for Extermination of Rats. (10 pp.) Aberdeen : The University Press, 1909.

U.S. Department of Agriculture, Bureau of Biological Survey.—Circ. 70 :—Directory of Officials and Organisations concerned with the Protection of Birds and Game, 1909. (16 pp.) Washington, 1909.

U.S. Department of Agriculture.—Farmers' Bulletin. No. 369 :—How to Destroy Rats. (20 pp.) No. 376 :—Game Laws for 1909. (56 pp.) Washington, 1909.

Department of Agriculture, Eastern Bengal and Assam.—Bull. 22 :—Poultry Industry. (13 pp.) Shillong, 1909.

Sturges, Rev. T. W.—The Poultry Manual. (597 pp.+plates.) London : Macdonald and Evans, 1909. 6s. net.

Kansas State Agricultural College, Experiment Station.—Bull. 162 :—The Marketing of Eggs. (16 pp.) Manhattan, 1909.

Forestry—

U.S. Department of Agriculture, Forest Service.—Circ. 164 :—Properties and Uses of the Southern Pines. (30 pp.) Circ. 166 :—The Timber Supply of the United States. (24 pp.) Circ. 167 :—The Status of Forestry in the United States. (39 pp.) Circ. 168 :—Commercial Importance of the White Mountain Forests. (32 pp.) Circ. 171 :—The Forests of the United States : Their Use. (25 pp.) Bull. 76 :—How to Grow and Plant Conifers in the North-eastern States. (36 pp.) Bull. 78 :—Wood Preservation in the United States. (31 pp.) Washington, 1909.

Hutchins, D. E.—Report on the Forests of British East Africa. [Cd. 4723] (143 pp., map and 25 photographs.) London : Wyman and Sons, 1909. 2s. 5d.

Baterden, J. R.—Timber. (351 pp.) London : Constable and Co., 1908. 6s. net.

New Zealand, Department of Lands.—Forestry in New Zealand. (118 pp.) Report of the Royal Commission on the Timber and Timber-Building Industries. (832 pp.) Wellington, N.Z., 1909.

Mookerji, D. N.—A Monograph on Paper and Papier-Mache in Bengal. (8 pp.) Calcutta : The Bengal Secretariat Book Depot, 1908. 2d.

Fron, A.—Sylviculture. (496 pp.) Paris : J. B. Baillièrre et Fils, 1909. 6 francs.

U.S. Department of Agriculture, Bureau of Statistics.—Bulletin 51 :—Foreign Trade of the United States in Forest Products, 1851-1908. (32 pp.) Washington, 1909.

Colonial Office.—Miscellaneous Reports, No. 66 :—Gold Coast, Report on Forests by H. N. Thompson. [Cd. 4993.] (238 pp. and map.) London : Wyman and Sons, 1910. 1s. 1d.

U.S. Department of Commerce and Labour.—Forest Products. No. 2 :—Lumber, Lath, and Shingles, 1908. No. 5 :—Veneers, 1908. (13 pp.) Washington, 1909.

Engineering—

U.S. Department of Agriculture, Bureau of Plant Industry.—Bull. 154 :—Farm Water Supplies of Minnesota. (87 pp.) Washington, 1909.

U.S. Department of Agriculture, Office of Experiment Stations.—Circ. 86 :—A Preliminary Report on the St. Francis Valley Drainage Project in North-eastern Arkansas. (31 pp.) Bull. 217 :—Drainage of Irrigated Lands in the San Joaquin Valley, California. (58 pp.) Washington, 1909.

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- Bright, T.*—Agricultural Surveyor and Estate Agent's Handbook. (404 pp.) London : Crosby Lockwood and Son, 1899. 7s. 6d. net.
- Brown, Sir Hanbury.*—Irrigation, Its Principles and Practice as a Branch of Engineering. (301 pp. and plates.) London : Constable. 16s. net.
- Scott, J.*—Text-Book of Farm Engineering. (149+123+167+199+181+128 pp.) 1908. 12s. Farm Buildings. (167 pp.) 1905. 2s. Farm Roads, Fences, and Gates. (123 pp.) 1907. 1s. 6d. London : Crosby Lockwood and Son.
- Baker, T., and Dixon, F.E.*—Surveying. (236 pp.) London : Crosby Lockwood and Son, 1909. 2s.
- Martin, E. A.*—Some Observations on Dew Ponds. (22 pp.) (*Geographical Journal*, August, 1909.) 2s.
- Casson, H. N.*—Cyrus Hall McCormick, his Life and Work. (264 pp.) Chicago : A. C. McClurg and Co, 1909
- Henderson, R.*—The Estate Manager. (548 pp.) Edinburgh : William Green and Sons, 1910. 15s. net.
- Deutsche Landwirtschafts-Gesellschaft*—Arbeiten. Heft 163 :—Hauptprüfungen von Kartoffeltrockenapparaten und Kartoffelerntemaschinen. (86+76 pp.) Berlin : Paul Parey, 1909.
- Goetz, Rev. E.*—The Rainfall of Rhodesia (Proceedings of the Rhodesia Scientific Association., Vol. III, Pt III.). (129 pp.) London : Waterlow and Sons, Ltd., 1909. 5s.

Economics—

- La Désertion des Campagnes* (29^e Congrès de la Société Internationale d'Economie Sociale) Tome 1 (189 pp.) Paris, 1909
- Skatweist, B.*—Die ökonomischen Grenzen der Intensivierung der Landwirtschaft (76 pp.) Berlin Paul Parey, 1909
- U.S. Department of Agriculture, Bureau of Statistics*—Bull. 76—Imports of Farm and Forest Products, 1906-1908 (65 pp.) Washington, 1909.
- Deutsches Kaiserliches Statistisches Amt.*—Landwirtschaftliche Betriebsstatistik. Teil 1a (*Statistik des Deutschen Reichs, Band 22*) (366 pp.) Berlin : Puttkammer and Muhlbrecht, 1909.
- Actes du VIII. Congrès International des Assurances Sociales* 3 Volumes. (817+762+700 pp.) Rome J Bertero et Cie, 1909.
- United States*—New Customs' Tariff. (101 pp.) 1909. [Cd. 4856] London. Wyman and Son, 1909. 18½d.
- Webb, C. A.*—Valuation of Real Property. (307 pp.) London : Crosby Lockwood & Son, 1909. 7s 6d. net.
- Report of the 41st Annual Co-operative Congress, Newcastle, 1909. (649 pp.) Manchester : Co-operative Union, Ltd., 1909.
- Lister, R. A.*—Danish Small Holdings. (36 pp.) Cheltenham : Norman, Sawyer & Co., Ltd., 1909. 6d.
- Cooper, Sir W. E.*—Britain for the Briton. (390 pp.) London : Smith Elder and Co., 1909. 10s. 6d. net.
- Pedersen, Henrik.*—Jordbesiddelse og Jordreform i England. (503 pp.) Copenhagen : Nielsen and Lydiche, 1909.
- Rohrback, W.*—Die Organisation der Hagelversicherung. (276 pp. and tables.) Berlin : Paul Parey, 1909. 10 marks.
- Palgrave, R. H. Inglis.*—Dictionary of Political Economy,* Appendix. (123 pp.) London : Macmillan and Co., Ltd., 1909. 2s. 6d. net.

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FORESTRY EDUCATION IN GREAT BRITAIN.

IN November, 1902, a Departmental Committee appointed by the Board of Agriculture and Fisheries to enquire into and report upon British Forestry presented a unanimous Report (Cd. 1,319) in which they urged, as the cardinal point of their recommendations, "the immediate and effective provision for bringing systematised instruction (in Forestry) within the reach of owners, foresters and woodmen." An article appeared in the issue of this *Journal* for April, 1904, in which was shown the effect which had been given to this recommendation up to that time. The purpose of the present article is to show what further progress has been made and what facilities exist in Great Britain at the present time for instruction in Forestry.

At the time the Departmental Committee were conducting their enquiry there were, broadly speaking, no organised courses of instruction in Forestry in Great Britain other than those held at the Royal Indian Engineering College at Cooper's Hill, and at the University of Edinburgh. At the present time there exist the following centres:—The University of Oxford, to which the Indian School of Forestry has been transferred; the Forest of Dean, where a School of Forestry has been established by the Commissioners of His Majesty's Woods and Forests; and eight other institutions, at each of which systematic courses of study in Forestry are provided, viz., the University College of North Wales, Bangor; Armstrong College, Newcastle-upon-Tyne; the University of Cambridge; and the Royal Agricultural College, Cirencester; the University of Edinburgh; the Glasgow and

West of Scotland Agricultural College; the Edinburgh and East of Scotland College of Agriculture; and the Aberdeen and North of Scotland College of Agriculture. In addition, mention should be made of the Inverliever Estate, in Argyllshire, which has been purchased by the Commissioners of His Majesty's Woods and Forests for the purpose of carrying out an experiment in afforestation on scientific and economic lines, and of the Alice Holt Woods, which are now being worked as a demonstration area for the practical study of Forestry. In certain Agricultural Colleges other than those mentioned, lectures on Forestry are delivered, but instruction in this subject has not been developed sufficiently at these institutions to require specific mention here.

The increase in the facilities for instruction in Forestry during the past seven years has been brought about in the first place by the attention drawn to the subject by the Report of the Committee; secondly, by the action of the Commissioners of His Majesty's Woods and Forests in certain areas of land belonging to the Crown; and thirdly, by the financial assistance given by the Board of Agriculture and Fisheries to the University College at Bangor, to Armstrong College, and to the University of Cambridge, to enable these institutions to appoint lecturers in Forestry. The agricultural colleges in Scotland are in receipt of grants in respect of the whole of their work from the Scotch Education Department, while for the past two years the Royal Agricultural College has been similarly aided by the Board of Education.

The following particulars of the above-mentioned centres have been supplied by the institutions named, or are taken from published reports:—

University of Oxford.—In 1905 the training of Indian forestry students, which had previously been conducted at the Royal Indian Engineering College at Cooper's Hill, was transferred to the University of Oxford. The School of Forestry which was then established is attended principally by probationers for service in the Indian Forest Department, who have been nominated by the Secretary of State for India, but other members of the University may attend the instruction in Forestry.

The Diploma in Forestry is granted to members of the University who have pursued a prescribed course of study extending over two years; undergone a course of practical work lasting nine months, of which about seven are spent with selected German forest officers in Germany; and satisfied the examiners in prescribed examinations.

The fees for instruction in Forestry and subjects auxiliary to it amount to about £63 during the two years, or an average of £10 10s. a term. In addition, students must meet the expenses (except railway fares) of the excursions in Great Britain which form part of the course. Students who are probationers for the Indian Forest Service are required to defray all their expenses at Oxford, but they receive, under certain conditions, a sum of £240 from the Secretary of State for India during the course of probation, which, in the case of those who have already passed with Honours in Natural Science, lasts for two years, and, in the case of the remainder, for three years.

School of Forestry, Forest of Dean.—This school was established in January, 1904, with the object of carrying out in one of the Crown Forests the recommendations made by the Departmental Committee. The course of instruction extends over two years. The number of young men entering each year is usually eight. Since the School was started 27 students have received certificates. The minimum age of entry has recently been raised from 16 years to 20. The young men are paid 15s. a week for their work, they receive practical instruction in the woods and attend lectures in a class room, the subjects of instruction being Forest Botany, Sylviculture, Forest Mensuration, and the Protection of Woods. A special building has been built for the purposes of the School and contains a class room, museum and carpenter's shop.

Applications for admission to the School, and for further particulars, should be addressed to Sir E. Stafford Howard, K.C.B., Commissioner of His Majesty's Woods and Forests, Whitehall, London, S.W.

University College of North Wales, Bangor.—A lecturer in Forestry at this College was appointed in the spring of 1904. At first Forestry was attached to the Department of

Agriculture, but since July, 1907, it has occupied an independent position as regards both the College and the University.

Two courses of study are offered by the College, one of these qualifying for the degree of B.Sc. in Forestry in the University of Wales, and the other for a College Certificate. A third course, leading up to a Diploma, is at present under consideration. The degree course extends over three years subsequent to passing a Matriculation Examination, while the course for the Forestry Certificate may be covered during a single session. Candidates taking the degree course devote their first qualifying year to general scientific study, attending classes in Botany, Chemistry, Physics and Zoology. During their second year they pursue the study of these subjects to a more advanced stage, and enter upon Forestry work. In the third year Forestry is continued and final courses taken in certain prescribed science subjects. In order to obtain the Forestry Certificate students need not matriculate, but have to satisfy the examiners in Chemistry, Botany, Zoology, and Agriculture, in addition to Forestry.

The number of students attending Forestry classes averages seven or eight each session. The fees are low, amounting only to £15 15s. per annum.

Several large proprietors have kindly placed their woods at the disposal of the College for Forestry instruction and practice, while an experimental area has been laid out by the Department at Chirk in Denbighshire. Lord Penrhyn allows the classes to visit his park, which immediately adjoins the College. In the park there is an excellent collection of conifers and broad-leaved trees, while there is also a large estate nursery which is useful for demonstration purposes. There are woods amounting to several hundred acres within a comparatively short distance of the College, and use is made of these for excursions.

The freehold of the land at Chirk was presented in 1906 to the Denbighshire County Council by Mr. John Mahler of Penissa Glyn, upon condition that it should be devoted to Forestry investigation carried out by the Department at Bangor. The land is 50 acres in extent and it has been divided into some thirty-two plots, each plot constituting a separate experiment. It is situated at a high elevation

(850-1250 feet), and is of a character frequently found in Wales. The planting has now been completed, and already some interesting results have been obtained. Through the generosity of the donor of the land, facilities have been given which enable students to visit the area several times each year.

The advice of the Department is sought by owners of woods in the neighbourhood, certain estates being visited periodically; and short courses of lectures in country districts have been given from time to time.

Armstrong College, Newcastle-upon-Tyne.—Lectures in Forestry have been given to the agricultural students in this College since 1892, but it was not until 1904, when the Board of Agriculture and Fisheries made its first annual grant in respect of Forestry, that a Lecturer in Forestry was appointed. Since this date special efforts have been made to develop the Forestry Department, and the success which has been achieved has been owing largely to the hearty co-operation of owners of woodlands in the neighbourhood. The Chairman of the Agricultural Committee of the College, Lord Barnard, has taken a special interest in the work of this Department.

Instruction in forestry forms a part of the regular courses of study for the B.Sc. degree in Agriculture (University of Durham) and for the College Diploma in Agriculture. In addition there is a special course in forestry, which includes practical work and demonstrations in the Chopwell Woods, and in other woods and nurseries during one or two days in each week, together with lectures additional to those given in the ordinary course. There is also a short course for young working foresters which lasts for four weeks. A further course for the same type of student is being organised at the present time, and is expected to include a course of lectures at the College lasting for from four to six weeks, and about twelve months' practical work in the woods. The fees for instruction in Forestry alone are £1 11s. 6d. a term.

As the result of an agreement between His Majesty's Office of Woods and the College authorities, the latter have taken over the local management of Chopwell Woods. These are within a few miles of the College, extend over 900 acres, and carry crops of larch, spruce, Scots pine, oak, ash, and other

trees. The woods will be gradually brought under a proper rotation of cropping by the clearing and replanting of the more mature portions. This work will afford favourable opportunities for demonstrations in practical forestry, and for the holding of short courses for practical foresters and others. It is anticipated that in a few years' time these woods will form an extensive and valuable demonstration area.

The experimental plantations and the tree nurseries at Cockle Park, the Northumberland County Agricultural Experimental Station, are available for demonstrations and practical instruction, and representative and appropriate private woodlands in the neighbourhood have been placed at the disposal of the College for the purpose of demonstrations to students. At Cockle Park ten plots of ground, consisting in all of about eight acres, have been laid off and planted with forest trees for the purpose of illustrating certain principles of silviculture. A small arboretum has also been formed consisting of conifers and a few deciduous trees.

Since 1904 many extensive woodlands have been visited by the Lecturer in Forestry, and reports and working plans prepared for most of them. In addition, the Lecturer has given advice by letter and otherwise to landowners and others in the North of England, and has conducted several important investigations into matters connected with the management of woods.

Extension Lectures in Forestry are held at various centres in the contributing counties; occasionally single lectures only are given, but usually courses of three to six lectures are held.

University of Cambridge.—Instruction in Forestry was instituted at Cambridge University in 1907, when a Forestry Committee of the Board of Agricultural Studies was formed, and a Reader in Forestry appointed.

The course of study for the Diploma in Forestry may be summarised as follows:—Candidates for admission to the examination for the Diploma must have (1) obtained the degree of B.A.; (2) passed qualifying examinations in Botany, Geology, Physics, and Chemistry; and (3) attended for two years courses of instruction in Forestry and cognate subjects.

The course for the first year includes lectures and practical work in Forest Botany, Silviculture and General Forestry.

During the Long Vacation the student spends ten weeks on a British woodland estate, in practical work under the superintendence of an experienced forester.

The course for the second year includes similar instruction in Forest Management and Forest Utilisation, and in Diseases of Trees and Timber, Timber, Forest Zoology, Surveying, and Engineering. During the Long Vacation of this year, the student has ten weeks' practical work in a Continental forest, under the superintendence of a state forester.

The total fees for instruction in Forestry for the Diploma course at the University amount to £9 19s. 6d. The fee for admission to the examination for the Diploma is £2 2s. The student in addition incurs the expenses, which are variable, of instruction during the two Long Vacations in a British and in a Continental forest.

An elementary course in Forestry has been established for agricultural students, who are now encouraged to take Forestry as an optional subject in the examination for the Diploma in Agriculture, and for the B.A. degree in Agricultural Science. This elementary course is identical with the first year's course for the Diploma in Forestry.

The average number of students who have attended courses of instruction in Forestry during the last two years is twelve.

The woods used for the purpose of demonstration are all privately owned, and lie in the neighbourhood of Cambridge and in the adjoining counties. The Forestry Department is indebted to various land-owners for the permission accorded to the Reader and his students to visit their woods and plantations. These visits, including those to the Botanic Gardens at Cambridge, are made weekly during term time, and afford an opportunity of seeing every type of woodland in the Eastern Counties, and of study of many Forestry operations.

There is no land at present under the control of the Forestry Department, but certain experiments have been carried out by the Reader and by the Lecturer on Timber, with the assistance of private owners interested in Forestry.

The Forestry Department is supported in part by annual subscriptions from the County Councils of Northamptonshire, Norfolk, Cambridgeshire, West Suffolk, and Huntingdonshire. Arrangements have been made with the Education

Committees of these contributing counties by which owners of woodlands and persons who contemplate planting, may receive advice free from the Reader in Forestry; and from time to time his services have been solicited. In addition, the Reader has advised in regard to various woodlands belonging to the Colleges of the University.

In the new building for the Agricultural Department, which is now completed, provision is made for a room for the Reader and for some museum and lecture-room accommodation.

Royal Agricultural College, Cirencester.—The course of instruction in Forestry was established in this College in 1903. There are two branches of the curriculum of the College, viz., the Estate Management and Forestry Branch, and the Farming and Colonial Branch. The majority, however, of the subjects are common to both Branches; and the Diploma may be taken in either Branch of the College.

The full Diploma Course occupies three years of three terms each. In addition, there is a two years' course. The fees are £45 a term for in-students and £25 a term (with an entrance fee of £5) for out-students. The average number of students in the Forestry Branch is about thirty. Instruction is given in the General Principles of Sylviculture, Forest Management, Preparation of Working Plans, Forest Protection, Forest Utilisation, and English Forest Law.

By the permission of Earl Bathurst, the Oakley Park and Woods, which cover an area of over 3,000 acres, and have been for many years under systematic management, are used for instructional purposes. They comprise fine woods of oak, ash, Scots pine, beech and larch. About 90 acres of coppice are annually cut over. Lord Bathurst has also placed some acres of the Park at the service of the College for an experimental area or forest garden. This is divided into ten half-acre plots, surrounded by screen belts. A useful Guide to the Forest Garden was printed in 1907 for the use of students. Visits for class instruction are also made to the estate nurseries and trade nurseries in the immediate neighbourhood; and periodical excursions are made to Gloucestershire forest areas, and in the Summer Vacation (if so desired) to Continental forests with the Professor of Forestry.

University of Edinburgh.—The first course of lectures in Forestry in this University was delivered during the Winter

Session of 1888-9, and the course has been conducted annually since that year. The Degree of B.Sc. in Forestry has recently been instituted with special courses in Advanced Forestry, Forest Botany, Forest Entomology, Chemistry of Forest Soils, and Forest Engineering with Drawing and Surveying. The Degree Course extends over three academic years, of which two and one-third are spent in residence. In addition, there is a First Course in Forestry which occupies a single Winter Session and forms part of the course for the Degree of B.Sc. in Agriculture.

The class-fee for the First Course of Forestry is £3 3s., and that for the Advanced Course of Forestry is £2 2s. The fees for the other Degree Courses amount to about £47. The Degree Examination fees are £6 16s. 6d., and the total, including the annual Matriculation fee of £1 1s., is thus about £60. The cost of board and lodging in one of the Halls connected with the University for each academic year of 30 weeks ranges between about £40 and £50, which for two and one-third years of residence comes to from about £90 to about £120. The total estimated expenditure by a Degree student for board and lodging, and University fees, with excursions and the practical course on the Continent, is about £300, or £100 a year.

During the 21 years of the existence of the Forestry Department, 201 students have passed through the First Course of Forestry, and during 14 years, from 1895-6 to 1908-9, 51 Agricultural students have passed in Forestry for the Degree in Agriculture. The University has no woods under its control, but practical instruction is given by means of visits paid to privately-owned woods in the neighbourhood. Among these are the woods of the Raith estate, owned by Mr. Munro Ferguson; and in order to enhance their value for instructional purposes, the lecturer has drawn up for them a working plan or scheme of management. There are several trade nurseries in the suburbs of Edinburgh, and visits are paid to the Arboretum and Galleries of the Royal Botanic Garden. In connection with the Advanced Course of Forestry, more extensive excursions are prescribed; and Degree students are required to undergo a training of six months in Continental forests.

The lecturer is in frequent correspondence with owners,

agents and foresters in regard to silvicultural questions; and he takes occasion, during the class excursions, to discuss such questions on the ground. He has drawn up a working plan for the woods for the Novar estate in Ross-shire; and he has, from time to time, given advice to local institutions on the planting of their lands.

The accommodation provided for the Lecturer on Forestry includes a lecture-room, and a class-museum containing a considerable number of illustrative objects. The University has a large library with reading rooms; and the Royal Scottish Museum possesses a large and separately arranged collection of works on Forestry, called the "Cleghorn Library," which was founded by the late Dr. Hugh Cleghorn.

Other Forestry Education in Scotland.—Provision is made for instruction in Forestry at each of the three Agricultural Colleges supported by the Scotch Education Department. In Edinburgh the University and the College together supply courses to meet the requirements of all classes of students, including those who make a comprehensive scientific study of the subject with a view to graduation. The West of Scotland College grants a special Certificate in Forestry, and at all three centres (Edinburgh, Glasgow, and Aberdeen) courses are given which cover the ground prescribed when Forestry is taken as a subject for the B.Sc. in Agriculture. There is also a comprehensive scheme of Extension Work in Forestry in connection with these centres.

Edinburgh and East of Scotland Agricultural College.—Instruction in Forestry has been given at this College almost since its foundation. The courses of study prescribed are: (a) A course for the College Diploma in Agriculture, given at the University by the University Lecturer in Forestry, to whose salary the College contributes in respect of this work. (b) An evening class instituted in 1905-6, and held annually since that date. A course at this class consists of 21 lectures, besides excursions for demonstration purposes. The attendance is principally composed of foresters, gardeners, nursery-men, and the young men employed in the estate management departments of large legal firms. (c) Extension courses consisting of from 12 to 20 lectures. Since the foundation of the College in 1901, courses of this kind have

been given at eleven different centres within the College area, the average attendance at each course being 48.

Some of the classes of this College are recognised by the University of Edinburgh as qualifying for the B.Sc. in Forestry. Facilities for practical work are provided by several of the landlords in the neighbourhood of Edinburgh, and the large collections illustrative of Forestry in the Royal Scottish Museum (an institution administered by the Scotch Education Department) are available for use by the students of the College. The fee for course (a) mentioned above is £3 3s., that for course (b) is 5s.

West of Scotland Agricultural College, Glasgow.—The Forestry Department at this College was established in 1904. The courses of study consist of (a) an optional course for the Degree of B.Sc. of Glasgow University; (b) a course for the College Certificate in Forestry; and (c) Evening Classes in Forestry for students who are unable to attend day classes. Students preparing for the Degree and the Certificate attend the same lectures, but the latter are required, in addition, to engage in practical work. The course for the Evening Class follows the same lines as that for the day classes. The College is well provided with the illustrative material required for the study of Forestry.

The course for the College Certificate in Forestry is for working youths and men only. It extends over a period of $2\frac{1}{2}$ years, during which time the student is required to spend six months in Glasgow, taking classes throughout one Winter Session in the following subjects:—Forestry, Botany, Chemistry, Soils and Manures, Zoology, Book-keeping and Surveying. Previous to undergoing their collegiate course, students are also required to spend eighteen months on an estate, where they perform the duties of a working forester, keep a journal recording full details and costs of the work done each day, and attend lectures held by the College:

The students have to work in the woods, or at any work ordinarily done by estate workmen, and are under the same regulations. Students must be between the ages of 15 and 20, inclusive, on the day of admission.

The number of students attending Forestry lectures during the five years has averaged 23. The fee for the course of

day lectures in Forestry is £3 3s., and £8 8s. for the whole College course for the Forestry Certificate. The fee for the Evening Class, which consists of two courses each of nine weeks, before and after Christmas, is 10s. 6d. for each course.

Aberdeen and North of Scotland Agricultural College.—This College provides: (a) A course of fifty lectures, with excursions, for students who take Forestry as one of the subjects for the B.Sc. degree of the University in Agriculture. The fee for the course is £2 2s. Provision is also made for a supplementary course of fifty lectures accompanied by laboratory work and practical demonstrations for students who intend to make a special study of Forestry or who wish to prepare for the Forestry Diploma of the Highland and Agricultural Society. There are large wooded areas in the neighbourhood of Aberdeen and, through the liberality of several of the landed proprietors, excellent facilities are afforded for practical work. (b) There are further courses of instruction in connection with the extension scheme of the College. These are delivered to foresters and forest workers at centres, within the district that naturally falls within the sphere of interest of the College, where there are suitable and sufficient wooded areas. In 1907-1908 there were given sixteen such lectures, at which 650 persons were in attendance. In 1908-1909 there were fifteen lectures, with an attendance of 820. As the lectureship in Forestry was not established in the College until 1907, these facts are full of promise for the future.

Inverliever Estate.—This estate, containing about 12,530 acres situate on the west side of Loch Awe, Argyllshire, and lying at an elevation of between 120 and 1,400 feet above sea level, was purchased by the Commissioners of His Majesty's Woods and Forests in the year 1907. It is proposed to plant it gradually at the rate of about 150 acres per annum. Planting has been commenced this season near the centre of the Estate. A nursery is being formed at Ford and a number of seed beds have been sown and seedlings planted. A forester has been appointed, who resides on the estate and acts under the general supervision of the Committee. At present eleven men and four boys are employed. (Further

information respecting this estate appeared in the *Journal* for June, 1909, p. 219.)

Alice Holt Forest.—In the Report of the Departmental Committee on Forestry, to which reference has been made, it was recommended that the Forest of Alice Holt should be made available as a demonstration area for the practical study of Forestry. In order to carry out this recommendation as far as possible the Commissioners of His Majesty's Woods and Forests obtained in 1904 from Dr. Schlich, Ph.D., C.I.E., an exhaustive report on the condition of each of the woods comprised in the Forest. In this Report Dr. Schlich expressed his general approval of the operations which had recently been carried out, and developed in detail a working plan for their continuation in the future. In drawing up the working plan regard was had to this point, one of the objects being the provision of the best object-lesson in the treatment of woods of this description from a practical point of view, according to the methods of scientific forestry.

THE DISTRIBUTION OF THE LARGE LARCH SAW-FLY IN GREAT BRITAIN.

DURING the summer and autumn of 1909, the Board of Agriculture and Fisheries instructed one of their inspectors to inquire into the prevalence of the large larch saw-fly, *Nematus Erichsoni*, which was known to be widely distributed in the Lake District, and to be present in certain parts of Wales and Scotland.

In view of the destructive nature of the insect and the damage it has done in other countries, it was felt to be very desirable to ascertain whether it was spreading in Great Britain or whether its natural enemies were keeping it in check, and further, to ascertain whether any economical method of getting rid of the pest existed.

Damage Done by the Saw-fly in North America.—The large larch saw-fly has done an enormous amount of damage to the larch in North America. Mr. Gifford Pinchot says of it: “. . . a worm which afterwards develops into a saw-fly has, since 1882, killed nearly every full-grown larch in the

Adirondacks by eating away the leaves. Even the small and vigorous larches do not escape."¹ Another report on the saw-fly states that "During several extensive outbreaks since 1880 it has killed 50 per cent. to 100 per cent. of the mature larch over vast areas in the North-Eastern United States and South-Eastern Canada. It is evident that the amount of merchantable timber which has died as the result of defoliation by this insect will aggregate many billions of feet."²

The insect is now distributed throughout North and Central Europe, and Siberia, and in North America from Central Michigan to Labrador.

Life-History.—The life-history of *Nematus Erichsoni* has been carefully described in previous publications issued by the Board,³ and there can be little doubt from the description that the species of saw-fly in North America and in Britain is identical. American entomologists believe that it was introduced to North America from Europe. There is no evidence to show how the saw-fly was introduced into Great Britain, and it is quite possible that it has been present for a number of years, but for some cause or another has not until recently materially increased in numbers. Larch plantations are, indeed, said to have been defoliated in the Lake District by a caterpillar about the year 1868. The caterpillar has been stated to be identical with the larvæ of *Nematus Erichsoni*, but there are no records to prove that this was the case.

A few points in the life-history of the saw-fly which were previously not quite clear have been elucidated. It has been found that the caterpillars, when full fed, simply drop from the trees to the ground and there proceed to spin their cocoons; the cocoons were almost invariably found between the moss or litter and the soil, so that if the former be rolled back the cocoons are practically all exposed. Naturally the cocoons will be most abundant near the base of the tree, but they are also found scattered irregularly over the whole area covered by the crown.

¹ *A Primer of Forestry, U.S. Dept. of Agric. Bull. 24, Div. of Forestry.*

² "Insect Depredation in N. American Forests," *U.S. Dept. of Agric. Bureau of Entomology, Bull. 58, part 5, p. 60.*

³ *Journal of the Board of Agriculture, Oct. 1906, and Dec. 1908; and Leaflet No. 186.*

At the commencement of the inquiry (July 20th) in the Welsh area, it was possible to find the saw-fly (a very few), the eggs, and the caterpillars. No saw-flies were seen after

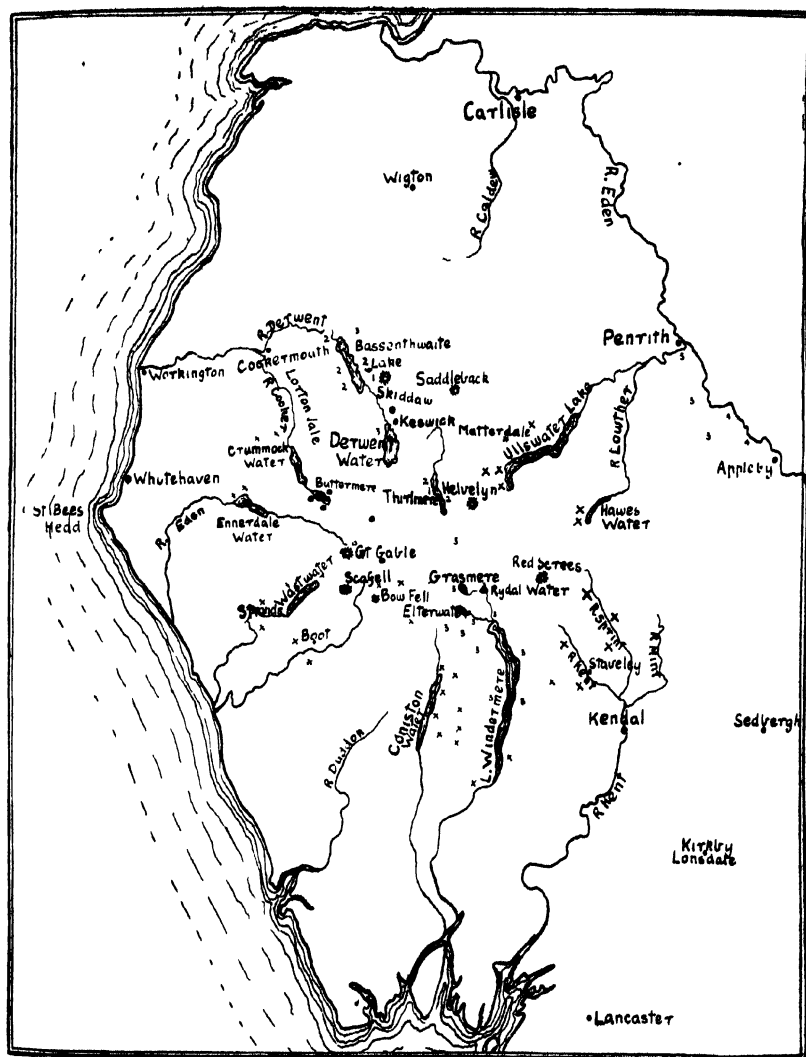


FIG. 1.—DISTRIBUTION OF LARGE LARCH SAW-FLY IN THE LAKE DISTRICT.
(The small numerals refer to the intensity of attack.)

July 31st, and no eggs a week later than that date. At this season of the year it is not always easy to detect the presence of the larvæ on a tree owing to their small size. The surest means of detection is to search for curled-up ends among the

current year's shoots. Such a shoot gives a clue to the presence of the saw-fly, and a further examination of the shoot will reveal the incisions made by the saw-fly's ovipositor on the concave side of the curve. If the eggs have been laid some time they will then appear in the slits as small "eyes" less than $\frac{1}{16}$ inch in diameter. The eggs are usually laid alternately in two rows, and as many as 40 may be found in one shoot. Usually the number is smaller, and averages perhaps 20. As the season advances and the caterpillars grow they are more easily detected, and may be readily shaken from the tree when nearly full-grown. Detection of a slight attack is probably easiest in the autumn, when the caterpillar has finished feeding. The curl at the end of the branch is then more pronounced, and the rosettes of needles will have been eaten for a distance of a foot or so from the isolated needles of the current year's shoot, which are not eaten to any extent. This gives a characteristic appearance to the shoot, and, with a little practice, renders detection easy. Confirmation of the presence of the saw-fly may be obtained by searching for the slits in which the eggs are laid at the end of the twigs. Usually also it is possible to find adhering to some of the twigs the moulted skins—as a rule, the black thoracic legs and black head—of the caterpillar.

The first cocoons were noticed in the Lake District on July 27th, the locality being a particularly warm and sheltered one, while caterpillars were found as late as August 31st in the Welsh District. The saw-fly, as a rule, lays its eggs only in the terminal shoots of the lateral branches. Occasionally, in cases of a bad attack, the leading shoot is attacked, but this is the exception. Where the infestation is of a moderate character, the caterpillars will be found on the lower and central branches of the crown, leaving the upper part practically free. Larvæ put into moss as early as the end of July at once commenced to spin cocoons.

Natural Enemies.—Among the enemies of the saw-fly may be mentioned the vole, rooks, jackdaws, chaffinches, and tits, and the ichneumon-fly, *Mesoleius aulicus*. At the present time these enemies do not appear to be gaining the upper hand. In certain localities in the Lake District, *M. aulicus*

was found to be abundant and actively attacking caterpillars, and it is believed that it is also present in the Welsh District, together with other parasites hitherto undetermined.

The chief hope of checking the depredations of the saw-fly appears to be in encouraging the spread of its insect enemies.

Distribution.—The saw-fly was first reported from the Lake District in 1906, from Cemmaes in Wales in September, 1907, and from Sundrum, Ayr, in September, 1907. In the first two cases the attack had already assumed considerable proportions, but in the last only a single tree was found with caterpillars on it.

After the first inspection in Wales it was seen that the insect was much more widely distributed than had been previously suspected, and a more complete inspection was made with the idea of mapping-out the extent of the country infected. To do this, it was thought advisable to devise some scale to show the intensity of the attack, and the following was adopted:—

Intensity I. (worst).—Some trees already dead, others with crowns very thin and practically defoliated in mid-summer. General appearance of trees moribund. Leading shoots have been attacked.

Intensity II.—No trees dead. Trees badly browned in mid-summer. Few terminal shoots to lateral branches produced during current year, dwarf-shoots thereby stimulated to growth with result that these new shoots have been utilised for egg-laying by the saw-fly.

Intensity III.—No trees dead, considerable numbers of the terminal shoots of lateral branches have had eggs laid in them. Little or no browning effect in mid-summer.

Intensity IV.—No trees dead. Very few of the lateral shoots show signs of attack.

The scale is rough, and of course artificial, but it serves to show the relative intensity of the distribution. Under this scale, an attack of Intensity II. to III. begins to cause serious loss of increment. Attacks of Intensity IV. have almost invariably been overlooked by foresters not acquainted with the insect.

A glance at the map for Wales will show how wide the distribution has become in a comparatively short time. The

insect has shown unexpected powers of spreading, and the difficulty of fixing an outer boundary for the area attacked is considerable. In general, it has been found that when one wood in a neighbourhood is infested, all the others are so to a greater or less degree, and that even when the attack becomes very attenuated, it is at the same time general.

Lake District.—The presence of the saw-fly was first noted in 1906. It is probable that the attack had already been in progress two to three years before it was noticed, since experience shows that it is only at the end of two to three years that the insect increases in numbers sufficiently to attract attention.

The Dodd Wood, from which the pest was first reported, has suffered most, and some 16,000 trees have died as the result of repeated defoliations. From this as a centre the saw-fly has apparently spread over the whole of the Lake District.

The attack appears to be worst in the neighbourhood of Keswick and on the Manchester Corporation's Plantations round Thirlmere, where the larch were practically stripped bare by the autumn of 1909. Southwards from Keswick the virulence of the attack becomes less. This is shown on the map drawn by Mr. Hewitt in 1908,¹ and observations made in the vicinity of Windermere, Ambleside, and Hawkeshead during the summer of 1909 confirm this opinion.

To the east and north the saw-fly has been noted as far as the Eden Valley and Carlisle. It was thought at the time the inspection was made that the absence of large masses of larch north of the Lake District, and the bare Fells to the East of the Eden Valley would stop the spread of the saw-fly north and east, but, as pointed out, the saw-fly has shown unexpected powers of distribution, and it has been found by independent investigators further to the east.

Welsh Area.—There is no evidence to account for the appearance of the saw-fly in Wales. It was reported in 1907 as having done considerable damage to a plantation in the vicinity of Dinas Mawddwy, but the probability is that it had already been there three or four years in the district. The

¹ *Journal*, December, 1908, p. 655.

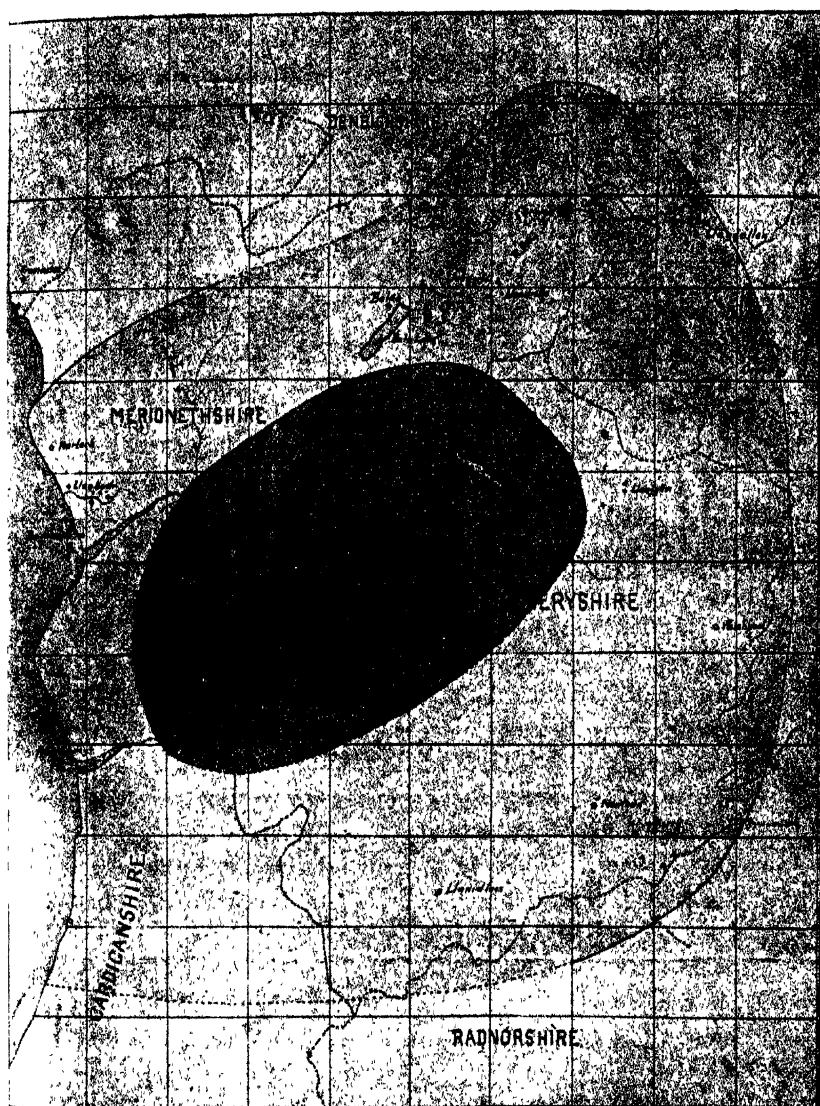


FIG. 2.—DISTRIBUTION OF THE LARGE LARCH SAW-FLY IN WALES.
(The small numerals refer to the intensity of attack.)

accompanying map has been drawn to show roughly the distribution according to intensity of attack. The centre of

infection appears to have been near Dinas Mawddwy in Merionethshire, and from thence it has spread westwards to the sea, and north, east, and south in the form of a rough ellipse, with its major axis running N.E. and S.W., and with a major semi-diameter of about 32 miles.

The West and South-West winds have probably played a leading part in the distribution of the insect.

In a period of about six years some 1,800 square miles of country have been infected, as follows:—

Intensity I.	...	...	...	1-2 square miles.
„ II.	...	...	...	6-8 „ „
„ III.	...	...	...	400 „ „
„ IV.	...	...	...	1,400 „ „

Compared with the area over which it has as yet spread comparatively little damage has been done. As pointed out, the pest begins to damage the trees seriously when the intensity of attack rises above III., and this is the case thus far on only 1 per cent. to 2 per cent. of the whole area. The danger lies in the future, for one may suppose that the insect will continue to spread over Britain in search of larch, and that finally, finding its advance checked, it will begin to become a serious pest in those districts where it is already established.

Scotland.—The distribution of *Nematus Erichsoni* differs materially in Scotland from the distribution in the Lake District and in Wales in that the intensity of attack varies but little over wide areas. In the last two districts, as has been pointed out, it is possible to point with some degree of probability to a focus from which the insect has spread in all directions. This is not the case in Scotland. The presence of the saw-fly has been noted in all localities where a search has been made. The intensity of attack rarely rises above IV., that is to say, the saw-fly is present, but in too small numbers to do damage. In the accompanying sketch-map the localities have been marked with a numeral showing the intensity of attack. It will be seen that the chief localities visited are Glenluce and Stranraer; Girvan and Ayr; Callander and Loch Vennacher; Perth to Dunkeld and Forfar. Signs of attack were also noted in the vicinity of Galashiels. It seems very probable, then, that a complete inspection

would reveal the presence of the saw-fly in the N.W. and S.E. of Scotland as well.

Remedial Measures.—It has already been noted that in the United States no successful remedy has been discovered against the saw-fly, and the diminution of the intensity of

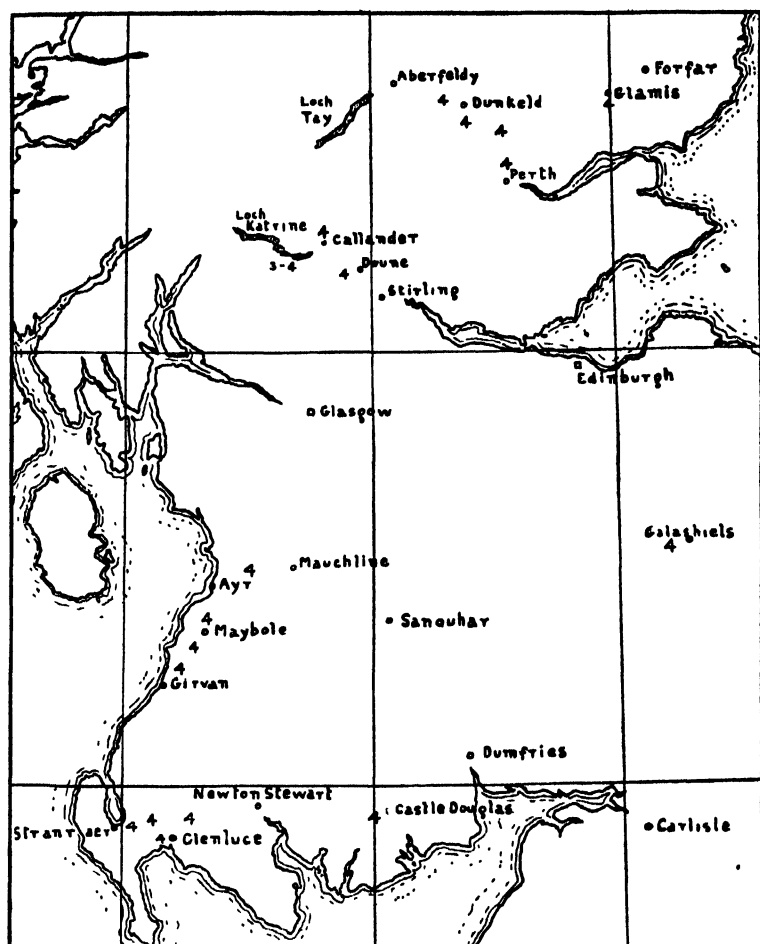


FIG. 3.—DISTRIBUTION OF THE LARGE LARCH SAW-FLY IN SCOTLAND.
(The small numerals refer to the intensity of attack.)

its attack from time to time has been due solely to natural causes.

The difficulty of treatment is due to a number of reasons. They are briefly :—

1. The nature of the life-history of the insect. The caterpillar winters in a cocoon under grass or moss, where it is

comparatively safe from the weather. On hatching, the female flies at once to the lower branches and lays its eggs (apparently without the intervention of the male), and the caterpillars, when full fed, do not descend the trunk but fall direct to the ground. Artificial remedies, such as tar-banding, are therefore of little use.

2. The saw-fly is very mobile, and can therefore spread rapidly.

3. Under the sylvicultural conditions which usually obtain in British larch woods the ground is covered with grass and moss, which renders the collection of cocoons difficult. For this reason there must always remain a number of woods in a district which it would be impossible to treat economically, and such would serve as centres of re-infestation.

4. The fact that tall trees are attacked equally with young ones.

5. The apathy which many owners show towards the welfare of their plantations.

At the Manchester Waterworks plantations at Thirlmere two remedies have been tried. The younger trees have been sprayed with a mixture of arsenite of copper, 1 lb., flour, 1 lb., and water, 128 gallons. A knapsack sprayer was used, and it was found that, by a suitable arrangement of tubes, trees from 15 to 20 ft. high could be conveniently sprayed. The spraying was undertaken towards the end of July, principally in two plantations eight years of age and 6 to 8 ft. high; the effect was greatly to reduce the number of caterpillars, though in the autumn there were still a few present.

The total area sprayed was about 40 acres, and the stock practically pure larch. The cost is given by Mr. Edwards, the forester, as follows:—

Cost of labour for spraying	...	£10	19	2
„ „ insecticide	... ..	1	3	6

Total ... £12 2 8

This works out at an average cost of about 6s. 1d. per acre.

In the older woods tar-banding was tried. It was noticed that during high winds and after heavy rains a number of caterpillars were to be found on the ground, and that, if left alone, they ultimately reached the crown of the tree again. To prevent this, the rough bark was removed from some of

the trees with a draw-knife, and a layer of Archangel tar put on with a brush. In this way a large number were caught, although it is probable that the number was small compared with the total number on the trees.

It has been found that with trees of about 7 cu. ft. contents, four men can tar about 700 trees in a working day of nine hours. One man can shave off the rough bark with a draw-knife, while three men apply the tar with brushes. This works out at 4s. to 5s. per acre. The tar remains moist enough to retain the caterpillars for about a fortnight.

Various other remedies have been suggested in the case of mature trees, such as raking up the cocoons, jarring the trees to shake down the caterpillars, and hand-crushing and hand-picking from young trees.

Of these, raking up the cocoons and burning or treating with lime is likely to be effective if it can be economically accomplished. Usually this will not be the case, owing to the tangled grass and the large area to be raked over. The risk of re-infestation from adjoining plantations which remain untreated must also be considered.

It is found that jarring the trees does not dislodge the caterpillars unless they are nearly full-grown, and even then a vigorous shaking of the crown is necessary. Trials of jarring, combined with tar-banding to prevent re-ascent, are necessary to prove the utility or otherwise of this treatment.

Hand-crushing is an excellent means of treatment in young plantations, and should be resorted to as long as the caterpillars can be conveniently reached.

Distribution of Saw-fly Caterpillar Parasites.—The inefficacy of the foregoing remedies is obvious where trees of any size are concerned. It is proposed to breed out cocoons from woods where ichneumons have been noticed at work, with a view to determining the percentage parasitised, and if a satisfactory result is obtained, to distribute numbers of the cocoons among woods where the attack is just beginning. By hatching the cocoons under a net the saw-fly can be retained and killed and the parasites allowed to go. It is hoped that in this way the parasites will obtain a much wider distribution than by natural means, and that the spread of the saw-fly will be checked and its attacks minimised.

THE THEORY OF THE FOUR STALLIONS.—

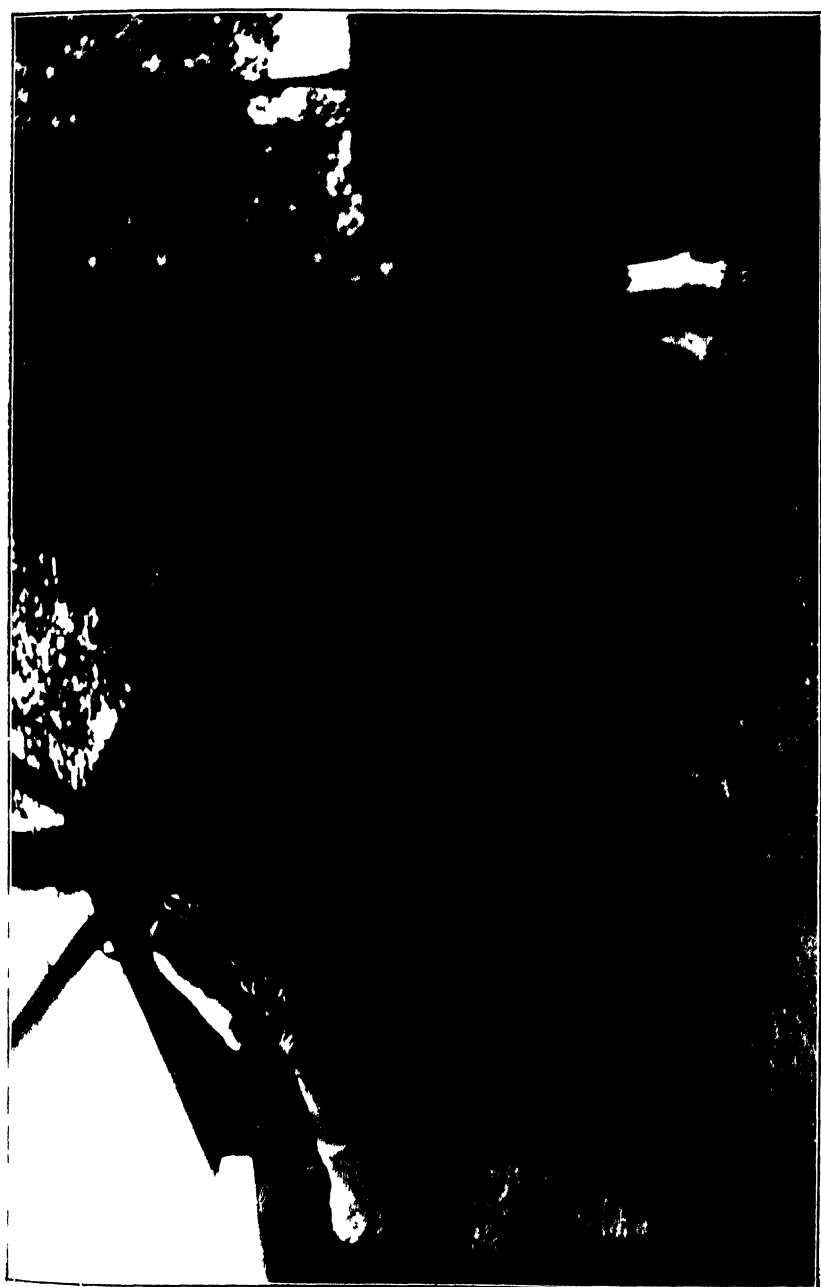
TYPES OF STALLION REQUIRED FOR
BREEDING HORSES FOR THE ARMY.

W. PHILLPOTTS WILLIAMS.

IN the number of this *Journal* issued in August, 1908, an article appeared on Army Remounts, and attention was drawn to the widely different types of horse purchased by Remount Officers. The difficulty which the Remount Department experiences in procuring a sufficient supply of several of these types is well known, and while this is in part due to the fact that too few horses are at present bred in this country, lack of numbers does not explain the whole situation. Every farmer who has gone in for breeding horses suitable for remount purposes knows how speculative the business is. Good specimens of the lighter and smaller horses may be bred with comparative certainty if reasonable care is taken in selecting brood mares, but when both substance and staying powers are aimed at, for each success obtained there are many disappointments. The really good weight-carrying animal when he is bred commands a high price, and is, of course, too good for the Army, but the majority of the horses of this class which farmers are able to offer are third or fourth raters which the Remount Officer will not take. The result is that the Army has great difficulty in finding satisfactory horses, and the breeder is disheartened and very often gives up the attempt to combine pace and substance.

I am well aware that no single remedy can be found for the present unsatisfactory condition of horse-breeding, and it is not my intention to discuss the whole subject in this paper, but I wish to point out one very obvious reason for the want of success which has hitherto attended this branch of live-stock breeding.

My view is that we do not possess a sufficient number of types of stallion. At the present time we can command a sufficient supply of one type only, whereas we should have four. Agriculturists have hitherto given nearly all their attention to heavy-legged horses,—Shires, Clydesdales and



Suffolks,—for in the past the breeding of these types has been much more profitable than the raising of lighter animals. On the other hand, those interested in the breeding of light-legged sires have, with few exceptions, concentrated their attention on the Thoroughbred. The consequence is that while we possess the finest race-horses and cart-horses in the world, our intermediate breeds of the types required by the Army for artillery and transport purposes are disappearing, as, for example, in the case of the Irish horse, or have already disappeared, as in the case of the pack-horse of Cornwall.

The result of this disappearance of intermediate breeds is that whereas it is comparatively easy to secure trueness of type when breeding at either end of the scale—light or heavy—the production of a good intermediate animal is largely a matter of chance. A common experience now is that when two animals, a thoroughbred and a heavy mare, each perhaps a good specimen of its own type, are mated, the offspring, so far as appearance goes, may be fairly satisfactory, but when the half-bred has been broken-in and is tested at work, he proves a disappointment: instead of a combination of the courage and staying power of the sire with the substance of the dam, the young horse may turn out a sluggish, soft animal; or it may be that his stamina is not up to his pluck and he develops into a “bad-doer,” expensive to keep and difficult to sell; or the quality of his bone may be found wanting, and splints and other ailments develop. Such experiences naturally discourage the horse-breeder, and it seems clear that until we get rid of some of the uncertainty that lies behind our present system of mating together animals which differ widely in type, the breeding of the intermediate class of horse cannot become popular.

The objections to the present system do not end with the first cross. Even when, as the result of mating the thoroughbred and the cart mare, a first-rate animal results, this animal is of relatively little use for breeding purposes. Half-bred stallions are seldom employed, for everyone realises that the stock will not be true to type; but half-bred mares are bred from, with the result that, however good in themselves, they produce foals of very unequal merit. This is a point to which breeders have not given nearly enough attention. They

rely on the breeding and prepotency of the stallion and forget that the mare carries qualities that do not appear in herself, but may be transmitted to her offspring. Recent investigations into the principles of breeding show that until the mare, as well as the stallion, has acquired fixity of type—that is, has become a pure breed—uniform results cannot be expected. Too much reliance has been placed on the prepotency of the sire by English breeders, and much more attention to the task of securing pure strains of mares of intermediate type is now required. The success of some of the breeding establishments of foreign governments is due to a recognition of this fact. In the Hungarian studs, for example, the so-called half-bred mares are pure strains, with pedigrees going back for many years.

So long, then, as we are content to rely for Army horses upon the offspring of two pure breeds as widely divergent in character as the thoroughbred and the draught-mare it seems to me that breeders must be prepared for many disappointments, and it is very unlikely that this department of horse-breeding will commend itself to those who are at present engaged in less speculative branches of live-stock farming. This is a very unfortunate state of affairs, for not only is it desirable from the national standpoint that horses suitable for Army remounts should be more extensively bred, but there is every prospect that if the breeding of light-legged horses were to receive as much attention as has been given to other forms of stock farming, the industry would prove a profitable one in many districts. It is, indeed, only necessary to turn to other classes of live stock to find examples of what is wanted for the horse. We have many races of cattle and sheep all carefully bred to type, so that a farmer in any part of Great Britain may easily secure a breed precisely suited to his locality, but when he wants a horse that combines pace and substance we find that the choice is practically limited to crosses between two widely different pure breeds. Both may be excellent in their own way, but it is not surprising that the more or less mongrel intermediate strains do not give satisfaction. What would the condition of the commercial cattle of the country be, if the breeder had to satisfy all demands by the intermediates got



from crossing such strains as Herefords and Jerseys, and would intermediates between the Hampshire and the Welsh Mountain breeds of sheep serve the purpose of every flock-master?

My contention is that the intermediate breeds of horse which have been lost must now be restored, and in order to get these types we must first of all set about breeding stallions. Including the thoroughbred, four distinct breeds seem to me to be necessary. These breeds are indicated by the four types of animal illustrated in this article.

TYPE NO. 1. THE LIGHT-WEIGHT THOROUGHbred.

As an illustration of my ideal animal of this type of sire, I select Battlement, owned by the Executors of the late General Jago-Trelawny, and a winner of several King's Premiums. This is a splendid specimen of the breed that has made English horses famous. He stands just over 16 hands high and is $8\frac{1}{2}$ inches below the knee. It is unnecessary for me to dwell upon the points of the breed, they are known to every horseman; fortunately, too, as there are 5,000 mares in Wetherby's Stud Book, there is no need for the Government to breed them. Breeders of race-horses will always take care of this type, and all that is necessary on the part of the Government is to see that a sufficient supply is placed at the disposal of farmers in horse-breeding districts. This can be done by offering premiums, by paying a bonus on the service of approved mares, and in other ways which it is not my purpose to discuss in this paper.

TYPE NO. 2. THE STRONG THOROUGHbred.

My second illustration is also that of a thoroughbred stallion, Pantomime, the property of the Compton Stud. This magnificent animal is a thoroughbred of unusual size and strength, standing over 16 hands and measuring 9 inches below the knee. Perfect in outline, with great bone and well-developed quarters, he is easily up to 17 stone; and he combines pace with power, so that he did well between the flags. A few of these large thoroughbreds are trained every season, but they go abroad as soon as they leave the training stables, and are lost to the country.

My suggestion is that the Government should take up the breeding of this type. A nucleus for a stud could be got by selecting big strong thoroughbred mares, of which there are a certain number still available; these should be mated with horses of their own class, and the breed gradually worked up until we could command the services of, say, 100 stallions of this type for the country. Once the type was secured, 300 to 400 brood mares should suffice to supply the number of this particular class of animal required for Great Britain.

TYPE NO. 3. THE WEIGHT-CARRYING HUNTER.

The third type of horse wanted is the Hunter up to 18 stone. My illustration is that of a cross-bred hunter sire, used by me in connection with the Cornish branch of the Brood Mare Society. This horse, Springald II., the property of Mr. Hocking, is by a thoroughbred sire out of a mare by a cross-bred sire. The sire of his dam was by a thoroughbred, and out of a strong mare. Springald II., although not bred the right way, is himself a very good specimen of the sort of horse we want to have, he is well formed, is 16 hands high and $9\frac{1}{4}$ inches below the knee. He has already proved himself to be a good getter of stock. His foals, though not so true to type as those of a thoroughbred, are very promising, can gallop, and are up to a good weight. His two-year-olds are as large as the four-year-olds by a thoroughbred out of the same mares, and so far they show the same quality. Animals of this type scarcely exist, and if they are to be produced, it must be done by starting from a strong hunter stock, and carefully selecting and mating the best fillies with a suitable stallion. It will be no use attempting to breed a supply of this class of horse by crossing thoroughbreds with draught mares.

TYPE NO. 4. THE ARTILLERY WHEELER.

I have been unable to find a stallion that meets my ideas of what we want in Type No. 4, and I have therefore selected a mare, Fortress, the property of Sir John Barker, and of unknown breeding. This animal, when photographed, was in hard work doing 30 miles a day on London streets,

TYPE No 3—'SIRINGALD II



and she does not appear to advantage in her photograph. Although not up to showyard standard in general character and quality, she is a model of the transport and artillery horse, 15½ hands high, and 9 nine inches below the knee, and with the best of feet and legs. She is a little short in the rib, but has no lack of stamina, and after a long day in the van returns fresh to her stable.

A breed of animals of this type would be more difficult to get than any of the others. A foundation stock might be obtained from the Yorkshire coach horse, and a few animals of the old Devonshire pack-horse breed might also be procurable. Or half-bred mares between the thoroughbred and the Irish draught horse might be got as a foundation stock. The finding of a stallion will be difficult, but when the mares have been got together, it should not be impossible to procure stallions to match them.

This type is so important, and it is likely that there will be so much difficulty in getting a good start, that mares of suitable size might be bred by different methods, with the object of finding the best foundation stock. Mares are wanted, in the first place, that have action as well as weight, and plenty of strength as well as good hearts. These mares would be subjected to tests for stamina at various speeds, and by weeding out soft animals a beginning would be made in the formation of a new breed.

In conclusion, I would again emphasise the necessity for keeping each type distinct. Any of the types might be intercrossed when an intermediate animal was required for Army or other work, but the breeds themselves which are to furnish the sires and mares for general horse-breeding purposes, after they have been formed, must be kept as pure as the thoroughbred or any other pure breed of animal, so that in this country there may be available for crossing purposes not only Type 1, the thoroughbred, but Types 2, 3, and 4. I am confident that many horse-breeders would be glad to use such stallions if they were only available.

THE DANISH SYSTEM OF CATTLE BREEDING.¹

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DENMARK is mainly an agricultural country, and the population has for centuries been chiefly occupied in agriculture. During the first three-quarters of the last century the growing and export of corn formed the chief source of income for the country, and at that time cattle played an inferior part. About the year 1850 dairy-farming began to come into prominence, at first on the large estates, of which there are not very many, and afterwards on some of the smaller holdings of a hundred acres and less, where the owners moved with the times. Two-thirds of the Danish soil is owned by peasant proprietors of holdings of an average size of 90 acres, but in the beginning dairy-farming did not pay as well on these small holdings as on the large estates, because butter produced in small quantities did not fetch as good a price.

Introduction of Co-operation in Dairying.—It was not till the middle of the eighties that dairy-farming became a general practice. At that time the centrifugal cream separator was introduced, and co-operation was applied to dairying. Co-operative dairies were built one after another throughout the country with amazing rapidity, and in consequence milk had the same value, whether from a single cow or from a herd consisting of a couple of hundred cows. All Danish farmers thus became interested in procuring the most productive cattle and in tending and feeding them well, so as to produce large quantities of milk at the lowest cost. From that time dairy-farming has been the chief source of income in Denmark, and the work of improving the quality of the cattle so as to obtain the greatest return has been carried on with great energy.

Breeds of Cattle.—Originally there were two distinct breeds of cattle in Denmark, the Black and White Jutland and the

¹ Abstract of Paper read at the Winnipeg meeting of the British Association, 1909.



Red or Red-and-White Island breed. Both were milking breeds, but small, and not well developed. In the first half of the nineteenth century many attempts were made to improve the national breeds by crossing with various foreign breeds, but experience showed that better results were obtained from the native breeds if only these were well cared for.

From the year 1870 the two national breeds have been kept pure. They are the *Jutland Dairy Cattle*, which are chiefly found in Jutland, and the *Red Danish Dairy Cattle* found on the islands. There are, besides, a few other breeds, but they are at present of little importance. The work of improving the breeding of dairy cattle has been simplified by the fact that attention could be centred on these two breeds, each confined to its own district.

Cattle Shows.—The first step taken to improve the cattle was the introduction of cattle shows. These shows were organised by the Agricultural Associations, while the State gave a small grant towards the prizes. At first all breeds and crosses competed together, and the judges simply picked out the individuals that appeared to be the most typical milkers. Later on the different breeds were kept separate, and prizes were awarded for animals possessing the typical characteristics of the breed.

English example showed that individual breeders could exercise the greatest influence on the general development of the breed by supplying superior breeding animals to other herds. This led to a change in the management of the shows, and prizes were awarded not for single cows, but for collections of cows bred by the exhibitor, the idea being to point out to intending buyers of cattle the herds from which they should buy. This change took place about 1870, and the showing of collections of cows continues to the present day.

When, in the eighties, interest in the improvement of cattle-breeding became more general, the State gave further assistance, and caused special shows for bulls over three years old to be held. The object of these shows was to encourage farmers to keep their good bulls for a longer time. The effect has been striking; while in 1887 only 371 bulls

were presented at these shows, there were in 1908 more than 1,200. At some local shows as many as 250 old bulls are shown every year.

Methods of Judging Cattle.—At these shows a new principle was introduced, viz., the judging of the bulls through their offspring. Prizes are not awarded for bulls five years old or older unless their offspring, which must be judged before the show, have been found satisfactory; the quality of the offspring is undoubtedly the best proof of the breeding value of a bull, and although the judging of the offspring takes a long time, it is a most useful institution, and a special feature of the Danish shows.

At these shows the judges do not restrict themselves to a consideration of the points of the exhibited animal, but also take into account in the case of bulls the pedigree, and information as to the milk production of the dam, grand dam, &c., and in the case of cows the milk production, both as regards quantity and quality.

Breeding Centres.—Another means of developing cattle-breeding has been the systematic selection of the best herds, which receive an official designation as "Breeding Centres." Experience has shown that certain herds have had a very great influence by supplying good breeding animals to other herds. It is, therefore, a matter of great importance to find such prominent herds and to encourage their formation, in order that good breeding animals may be distributed from them. It has been one of the special aims of the cattle shows to draw attention to such herds, but at the shows only a few animals from a herd are shown, and these not average specimens but the best individuals. It is also impossible at a show thoroughly to study the descent and the breeding quality of the animals, while their milk production cannot be properly estimated with due regard to the feeding, the way of keeping and of milking, time of calving, and other conditions affecting the production. For these reasons the judging at the shows has its distinct limitations, and a new feature, viz., competitions between the best herds in the country, has been introduced.

These competitions are carried on during two whole years; a Committee of Judges visit each of the competing herds

five or six times on the farms, and are assisted by young men who, on every twentieth day during the two years, visit each of the competing herds, weigh the milk of each individual cow, test its percentage of fat, weigh the fodder given to each cow, and draw up the family herd-book, &c. After the two years' testing the Committee of Judges are in possession of reliable information about the different competing herds, and a reliable award can be given. Those herds for which prizes have been awarded after such competitions are then termed "Breeding Centres."

A detailed report on the competing herds is published, so that each farmer can form his own opinion of the herds. The family herd-book drawn up for each herd is left with the owner. In this herd-book the whole herd is arranged according to maternal descent, and for each animal information is given as to the sire and dam, description, production, and prizes. This information forms a reliable and easily accessible guide to intending buyers, who can soon ascertain whether a certain animal belongs to a family of fixed type or whether it is an isolated star.

These competitions between entire herds, resulting in the selection of breeding centres, began in the year 1884, but it was not until 1894, when the Gerber transportable apparatus for estimating the percentage of fat in milk was introduced, that the competitions took the complete form here described. In 1897, the importance of these competitions was so generally acknowledged that the State gave a yearly grant of £4,000 sterling for four years to assist them. To the best breeding centres as much as £150 could be awarded annually for each of the four years. This encouragement from the State had a great effect; many more herds were entered for the competitions, and the attention of the whole farming community was awakened to the importance of securing good bulls, with the result that there was an increased demand for good breeding animals at enhanced prices. This grant from the State has since been discontinued, and the State now pays only for the administration of the competitions. But the competitions are continued, and preserve their popularity, while their good influence is unabated.

These two-yearly competitions between whole herds, as

well as the family herd-books drawn up in connection with them, are special Danish features.

Family herd-books have been drawn up for many other herds than those which have been selected as "Breeding Centres," and they form a valuable help in the management of the herd. Altogether, six hundred family herd-books are in existence. There are, of course, also the official herd-books for both breeds of Danish dairy cattle.

I have hitherto dealt with the systematic endeavours to encourage the breeders, and to find the best breeding centres and the animals within these which are considered most valuable for improving the breed. The chief aim has been to encourage economical dairy-farming; it is not only the points of a pure typical breed and a harmoniously developed milking strain which have been aimed at, but a large yield of milk and a high content of fat have also been duly considered. Definite information as to the yield of the cows and the yield of the dam of the bulls is demanded, and this information enters directly into the judging of the animals. For our ultimate goal is a breed of cattle not only fine in form and typical as milkers, but also and chiefly a breed giving a good money return.

I shall now deal with the efforts which have been made to let cattle-breeding in general benefit from the result of the work of prominent breeders, and thereby improve the position of dairy-farming throughout the country. Two features must be mentioned: the Associations of Cattle Breeders, or Cattle-Breeders' Societies, and the Control Unions or Cow-testing Associations.

Associations of Cattle Breeders.—Before the year 1870 little attention was given to the bull; the nearest bull or the cheapest bull was considered the best. The bull was generally used from one to two years old and then killed, so that before the influence of the individual bull could be traced in the offspring the bull had disappeared.

With the improved conditions in the seventies this was gradually altered, but it was not till the eighties, when the co-operative dairies caused greater attention to be given to the feeding and the production of the herds, that the influence of the sire as equal to that of the dam was generally acknow-

ledged. The idea was then introduced for several farmers in a district to buy and to use in common a good bull, and to keep this so long as it gave satisfaction.

This was the beginning of the so-called Associations of Cattle Breeders, which arranged that only the best cows should be served by the bull, and these cows should be selected by the Committee. The Committee should, furthermore, inspect the various herds belonging to members of the Association, and should ascertain the state of health of the animals. The offspring of the selected cows by the bull of an Association should be presented at the local show. The members of the Association were also required to keep accounts of the feeding and production of the individual selected cows.

The first of these Associations was formed in 1883. During the next years it found only a few imitators, but when the State, in 1887, offered these Associations a yearly grant, the development became a rapid one.

There are now 1,300 Associations of Cattle Breeders with 1,500 bulls, and for each bull the State gives a yearly grant of £8 on condition that the bull has taken a prize, that it is examined by a veterinary surgeon twice every year, that the best cows of the members are selected by the Committee to be served by the bull, and that the Committee at least once a year inspect all the herds in the Association as to their health.

The effect of these Associations on the development of cattle-breeding has been very striking. In the first place, 1,500 really good bulls are now in constant use throughout the country. The result of the work of the prominent breeders is thereby turned to advantage, while the increased demand for good breeding animals, resulting in better prices, in its turn encourages the effort to form new breeding centres.

The prices which these Associations pay for young bulls vary a good deal, but average about £40. Some of the leading Associations have paid as much as £170 for the best bulls. Generally about 80 cows are served by one bull, and the annual subscription of members averages about 3s. 6d. per selected cow, but is more in the Associations with more expensive bulls. The members' subscription is kept down

not only by the grant of £8 from the State, but also by the money prizes awarded for the bulls at the shows.

Milk-Control Associations.—The Associations of Cattle Breeders carried out their programme satisfactorily, except so far as keeping accounts of the feeding and production of the individual cows. When in the beginning of the nineties their account-keeping was increased by a demand for information as to the percentage of fat in the milk, it was found quite impossible for individual members to do this work, although it was generally admitted to be very important. It was particularly necessary to have the richness of the milk tested, as no outward sign gives any indication of this point.

This led to the formation of the Control Unions, the first of which was formed in 1895. The object of these Unions is to strike a balance-sheet for each individual cow, for guidance in feeding, for weeding-out cows that do not pay, and for help in selecting those cows from which to breed. The object is attained by the farmers within a limited district jointly appointing a young man as "Control Assistant," who once every fourteen or twenty days visits each member, measures the quantity of one day's milk yielded by each of his cows, estimates the percentage of fat by means of the Gerber apparatus, and weighs the food given daily to each cow and keeps account of all this. He has, further, to keep a list showing when the cows were served, when they have calved, the sex of the calves, and what has become of them. All this is for the purpose of drawing up a family herd-book at each farm.

These Control Unions have found great favour with Danish farmers. There are at present 479 Unions, comprising 10,925 farmers with, together, 187,345 cows, or more than 17 per cent. of the total number of cows in the kingdom. The work of the Unions is carried on by more than 500 assistants; the State gives its support by grants up to £14 per Union, but not more than a total of £6,670 in any one year. The subscription of the members is one to two shillings per cow per annum.

• These Unions are undoubtedly very useful. It is only through the work of these Unions that it is possible to obtain the information about the yield of the individual animals by

which the animals are judged at the shows and competitions. The selection of cows within the Associations of Cattle Breeders is also carried out on the basis of the data obtained from the Control Union.

Result of the Work.—If I am asked what has been the result of all these features of the work of improving the breeds of dairy cattle, I shall not be able to give a satisfactory answer. I might say that the yield of Danish cows averaged in 1864 about 80 lb. of butter; in 1887 116 lb. of butter; and in 1908 220 lb. of butter.

I might mention that the export of home-produced butter from Denmark during the years 1865–1874 was about 130,000 cwt., while in 1905 it was 1,590,000 cwt., in 1907 1,710,000 cwt., in 1908 1,778,000 cwt.

I might further mention that while the average yield of Danish cows is about 220 lb. of butter, the average of the 40,000 cows in the Control Unions in Funen was about 285 lb., and that the average yield of the best herds is more than 330 lb. of butter per cow.

But these figures do not give a true representation of the result of the improvement in the quality of the herds, which is due to the better selection of breeding animals, because concurrently with this improvement there have been other improvements, notably in the better feeding of the cows and the better rearing of the young stock. To feed our cattle, we now have to import large quantities of corn and other feeding stuffs, while the production of roots has been enormously increased. The number of cows has also been increased considerably.

How much of the improvement is due to the better quality of the herds, and how much to the better feeding, it is impossible to say. But it is certain that there has been an improvement, and a very considerable one, and I feel convinced that our endeavours have tended to improve the breeds of dairy cattle in Denmark.

THE NEW NITROGENOUS FERTILISERS— CALCIUM, CYANAMIDE, AND NITRATE OF LIME.

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IN view of the importance of the two new fertilisers containing nitrogen extracted from the atmosphere—calcium cyanamide or nitrolim and nitrate of lime—both of which are now becoming regular articles of commerce, the results of a comparative trial of these manures against sulphate of ammonia and nitrate of soda, made at Rothamsted in 1909, may not be without interest. The experimental plots were situated in Little Hoos field, the soil of which, as of the other Rothamsted fields, is a heavy clay loam containing between 1 and 2 per cent. of carbonate of lime in the surface soil; the land was in poor condition, and had not received dung for many years previously. The land was given a uniform manuring of 336 lb. of superphosphate (37 per cent. soluble) per acre, then each plot, except the two control plots, received 50 lb. of nitrogen per acre in one of the selected forms—nitrate of soda, nitrate of lime, sulphate of ammonia, and calcium cyanamide.

The crop selected for experiment was barley—Archer's stiff straw; but owing to the cold and wet character of the season, the amount of nitrogen applied was too large, despite the poor condition of the soil, so that the plant on all the plots receiving nitrogen became much laid during July. In consequence, the plots had to be cut by the scythe, and the weights of straw are not very trustworthy owing to the difficulty of cutting them uniformly.

The manures were applied on March 8th and ploughed in, but showery weather followed, and it was not possible to sow the barley until April 6th. Germination was even and regular; all through the early part of the season growth was good, and the plots looked uniform; the plots receiving either nitrate of soda or nitrate of lime always appeared to be a little better and taller, this being usually the case at Rothamsted, where nitrate of soda always produces more straw than do ammonium salts. The following table gives the details of the yield on the ten plots, there being duplicate plots for each manure;—

*Experiments on Barley with Nitrogenous Fertilisers,
Little Hoosfield, Rothamsted, 1909.*

Plot.	Manuring per acre. 336 lb. superphosphate, 50 lb. nitrogen.	Quantities per acre.						Particulars of Quality.		
		Dressed grain.	Dressed grain.	Offal grain.	Total grain.	Total straw.	Total produce.	Weight per bushel of dressed grain	Proportion of offal to 100 dressed.	Proportion of grain to straw as 100.
		bush.	lb.	lb.	lb.	lb.	lb.	lb.		
1	} Superphosphate alone.	27'69	1495	101	1596	2511	4107	54'0	6'8	63'6
6		29'69	1640	182	1822	2727	4549	55'3	11'1	66'8
2	} Superphosphate & nitrate of soda.	44'62	2231	277	2508	3429	5937	50'0	12'4	73'1
7		51'57	2830	316	3146	4334	7480	54'9	11'2	72'6
3	} Superphosphate & nitrate of lime.	45'17	2417	364	2781	4806	7587	53'5	15'1	57'9
8		47'14	2595	321	2916	4091	7007	55'1	12'4	71'3
4	} Superphosphate & sulphate of ammonia.	49'34	2683	280	2963	2943	5906	54'4	10'4	100'7
9		48'82	2673	270	2943	4091	7034	54'8	10'1	71'9
5	} Superphosphate & cyanamide.	43'86	2388	182	2570	4469	7039	54'4	7'6	57'5
10		46'48	2545	300	2845	3483	6328	54'8	11'8	81'7

The initial poor condition of the land is seen in the large return from the nitrogenous fertilisers, which increased the yield from about 28½ bushels of grain to over 47 bushels, taking the average of the eight plots receiving nitrogen. The duplicate plots agree fairly well with one another except in the case of the nitrate of soda plots, where the difference is rather great, though not perhaps more than may normally be expected. One of the sulphate of ammonia plots also gives too low a yield of straw; this is probably a real error, due to bad cutting of the laid and twisted straw.

The sulphate of ammonia plots give slightly the best results as regards grain, but the differences between the plots receiving sulphate of ammonia, nitrate of soda, and nitrate of lime are all within the limits of experimental error, and the yield of grain may be taken as approximately the same for each fertiliser. On the permanent barley plots at Rothamsted, ammonium salts give over a lengthy period the same average results as nitrate of soda.

The average yield with cyanamide is a little below that with the other fertilisers, 45'2 bushels against 47'5, a difference of a little more than 5 per cent. Taking the series of plots

2 to 5, cyanamide occupies the lowest place, as again it does in the other series 6 to 10, and this looks as though cyanamide might be a little less effective than the other fertilisers. The differences, however, are within the range of the experimental error, and the only conclusion that it is safe to draw until the experiments have been extended, is that when such a quantity as 50 lb. of nitrogen per acre is employed, all the fertilisers are equally effective in producing grain. Of course, on the Rothamsted soil, which contains a sufficiency of carbonate of lime, the quicklime, which is often so valuable a constituent of the cyanamide, is without effect, and the fertiliser acts as a source of nitrogen only.

As regards the proportion of offal corn, sulphate of ammonia and cyanamide have done rather better than either of the nitrates, yielding only about 10 per cent. of offal corn against 13; this also is in accord with previous experience. The weight per bushel shows but little variation, except in the case of one bad sample grown with nitrate of soda, which, for some unexplained cause, gives a result much below that of any other plot. For reasons that have already been explained, the straw returns possess little value, but they would seem to confirm the impression formed by the eye during the growing period that the plots receiving nitrates, either of soda or lime, yield the greater amount of straw.

It will thus be seen that the experimental plots were not numerous enough to enable one to determine in a single season the magnitude of the difference, if any, between the four nitrogenous fertilisers selected for comparative trial.

One sees, however, that if any difference does exist between the effectiveness, nitrogen for nitrogen, of nitrate of soda and nitrate of lime, or of sulphate of ammonia and cyanamide, it will be only a difference of 10 per cent. or less. That being the case, it should be the character of the soil and the relative price of the fertilisers per unit of nitrogen, which should dictate the choice between them. The Rothamsted soil has no special peculiarity, and suits any of these fertilisers indifferently, but on other soils—very light sands, heavy clays, soils very short of lime—secondary considerations, which do not come into play in these experiments, will make one or other of these fertilisers the preferable manure.



FIG. 4.— BLEEDING AGARIC

(Utricularia hemithudiana)

EDIBLE FUNGI.*

BLEEDING AGARIC, *Agaricus hæmorrhoidarius* (Fig. 4).

The cap is globose, when expanded it is brownish, tinged with red or purple at the centre, scaly, 3 to 5 inches across; gills rosy, then purplish umber; stem 4 to 5 inches long, cylindrical, base swollen, white, instantly becoming stained red when bruised, hollow, ring large. The flesh of the cap is thick, white, and like the flesh of the stem, instantly becomes red when cut.

It is most abundant in pine woods in the autumn. It may be easily recognised by the dark-coloured gills, and by every part of the plant becoming deep red when bruised or cut.

The flavour of this variety is also stated to be superior to that of the common mushroom.

SHAGGY CAPS, *Coprinus comatus* (Fig. 5).

This is a distinctly marked fungus, which cannot be confounded with any other species. The cap is cylindrical and covered with a dull yellow crust, which becomes broken up into more or less shaggy scales, exposing the white flesh, 4 to 7 inches high. Gills white at first, then pinkish, finally black, closely crowded. Stem white, 6 to 9 inches long, thickened downwards.

At maturity the cap splits and turns upwards, and the gills deliquesce into a black, inky fluid, which drips to the ground. The entire substance of the cap also eventually melts away, leaving the stem alone standing.

It occurs in considerable numbers, amongst grass or on waste ground in early summer and autumn.

It is usually eaten when the gills are flesh-coloured near the edge, and before they commence to turn black. It may also be eaten after the gills have become black, but the inky-looking mass is not inviting.

WARTY CAPS, *Amanita rubescens* (Fig. 6).

This is globose at first, then expanding until nearly flat, of dull brick-red or dingy reddish-brown colour, more or less covered with whitish patches that are easily rubbed off, 3 to 5

* Nos. 1-3 of this series of coloured plates and descriptions appeared in the *Journal* for February, 1910.

inches across; gills white, becoming blotched with brown here and there; stem white, changing to brown when handled, ring large. Flesh of cap and stem white at first, gradually becoming tinged with reddish-brown, and changing at once to that colour when cut and exposed to the air.

It is found on the ground under trees, etc., in summer and autumn, and has a delicate flavour.

This species requires to be carefully distinguished from deleterious allied species, which differ from it in the flesh not changing colour when broken.

"Celery leaf-spot" caused by *Phyllosticta apii*, Halsted, was first observed in the United States in 1891, and since that date it has repeatedly proved to be a

**Leaf Diseases of
Celery.**

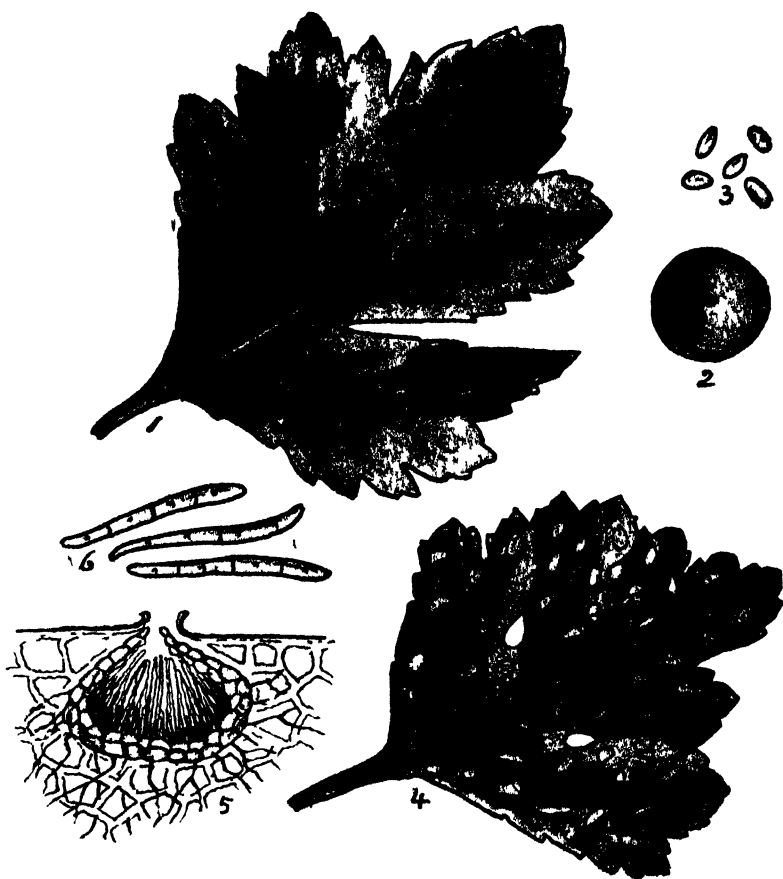
destructive parasite on celery. The foliage is the part attacked, and the disease is readily distinguished among the several leaf parasites of celery by the presence of one or more large blotches on a leaf. These blotches are at first dull brown, afterwards paler, dry, and studded with numerous black points or perithecia, each containing numerous very minute spores. When the spores are ripe the dead portion of leaf on which they are produced crumbles and falls to the ground, carrying along with it the spores of the fungus, which infect the soil and prove a menace to following crops. Numerous spores are also liberated at the moment of maturity, and are conveyed by various agents to adjoining leaves, by which means the disease spreads with great rapidity during damp, dull weather. During 1909 this fungus appeared in Sussex under the form of an epidemic in a field of celery, and much injury was experienced.

A second celery leaf disease caused by a parasitic fungus called *Septoria petroselinii*, Desm., has been long known in this country and on the Continent. In this instance the leaf becomes studded with numerous small, irregularly angular, brown spots, each bearing a few very minute black points or perithecia, containing myriads of very slender needle-shaped spores. As a rule when this fungus attacks celery an epidemic results, due to the rapid production and dispersal of spores.



FIG. 5.—SHAGGY CAPS
(*Coprinus comatus*)

Preventive Measures.—The two diseases indicated yield to the same method of treatment, providing preventive measures are commenced at a sufficiently early stage. Spraying with half-strength Bordeaux mixture should be carried out on the first appearance of the disease. Three applications at intervals



CELERY LEAF DISEASES

- 1 — *Phyllosticta apti* on celery leaf Nat size
 2 and 3 — Perithecium and spores of same Highly mag
 4 — *Septoria petrovelini* on celery leaf Nat size
 5 — Section of perithecium of same, embedded in a leaf Highly mag.
 6 — Spores of same Highly mag

of a week usually prove sufficient to check the progress of the parasite. The injury caused is most serious when the foliage is attacked during an early stage of growth, and careful watch should be kept on the crop, more especially in districts where the disease is prevalent,

THE Board have received the following note from Mr. C. K. Bancroft, B.A., on certain investigations on which he is engaged at the Jodrell Laboratory,

**The Brown Rot
of the Tomato.**

Kew.

This disease is well-known to growers of tomatoes in this country, and during the past two or three years many have suffered considerable loss owing to the destructive nature of the pest. The fungus appears to attack the fruits only, the other parts of the plant show no external signs of infection. A fruit which is infected first shows discoloured patches on its surface; these usually run together, so that the whole, or almost the whole, surface of the fruit becomes discoloured. The pulp inside becomes reduced to a dark-coloured mass.

The seeds of infected fruits are of a darker colour than those of healthy ones, and a microscopic examination shows that, whereas the testa of the dark-coloured seeds is intact, the tissues of the endosperm and embryo contain fungal hyphae, which from their characters appear to be hyphae of *Phytophthora omnivora*. In spite of the occurrence of the hyphae, the cells of the endosperm and embryo appear to be healthy.

This infected seed or "brown seed," as it is sometimes called, is known among the growers to be capable of germinating, and is reported to produce plants which always bear infected fruits. These facts, coupled with the results of microscopic examination of the seed, suggest that the hyphae may be capable of existing in the seed in a resting condition, becoming active when the seed germinates, and keeping pace with the growth of the plant until the fruit is formed.

Whereas it is clear that "brown seed" always contains fungal hyphae, the hyphae cannot be regarded as being in a resting condition in the seed until they have been shown to be capable of activity when the seed germinates. Attempts are being made to ascertain whether this is so, that is, to trace the growth of the hyphae in the seedling, and to demonstrate their presence in the mature plant.



FIG. 6.—WARTY CAPS

(Amanita rubescens)

The cultivation of hops in the United States is chiefly confined to the four States of New York, Oregon, California, and Washington. No official statistics of the area under cultivation are available for a later year than 1899, but there is reason to believe that there have been considerable fluctuations during the past decade.

Hops in the United States. *Area under cultivation.*—In 1899 there were 55,613 acres under hops in the United States, of which 27,532 were in the State of New York, 15,433 in Oregon, 6,890 in California, 5,296 in Washington, and only 462 acres elsewhere. Between 1900 and 1907 the area in Oregon and California is said to have increased by some 12,000 acres, and this estimate seems to have been fairly accurate, as in the spring of 1908 an association of hop-growers ascertained that there were 26,152 acres of hops in Oregon and some 7,000 acres in Washington. The unfavourable prices realised in 1908, however, caused many of the hop plantations to be ploughed up, the area thus abandoned amounting, it is stated, to 8,000 acres in Oregon and 3,500 acres in Washington.

Prices.—The extent to which prices have fluctuated since 1899 may be gathered from the following table, which is compiled from prices given in the *Crop Reporter*, published by the United States Department of Agriculture.

	Choice Hops (New York)	
	Pence per lb	
	February	September
1899	—	6 — 6½
1900	6½ — 6½	6½ — 7½
1	—	6½ — 8
2	7½ — 9	13 — 14
3	16½ — 18½	12½ — 15
4	18 — 19	16½ — 18½
5	15 — 18	10 — 11½
6	7 — 8½	7½ — 8½
7	10½ — 11½	6 — 7
8	6½ — 8	3 — 3
9	6 — 7½	9 — 10
1910	16½ — 17½	—

It will be seen that after several years of comparatively low prices, a rise occurred in 1902, which continued with fluctuations until 1905, and it was no doubt during this period that the extension in area occurred. In 1906-8 prices declined again, but in the early months of 1909 some recovery took place, followed by a sharp rise after October last.

The above prices are those obtained in New York, but in the Pacific States values in 1908 seem to have fallen even lower than on the Atlantic seaboard. The British Consul at Portland, Oregon, reported that in the spring of 1908 considerable parcels of hops were sold at very low prices, ranging from $1\frac{1}{2}d.$ to $3d.$ for 1907 crop and $\frac{1}{2}d.$ to $1d.$ per lb. for old hops. Prices for Californian hops towards the end of the year ranged from $3\frac{1}{2}d.$ to $4d.$ per lb. By June, 1909, prices had advanced and from $4\frac{1}{2}d.$ to $5\frac{1}{2}d.$ was being paid for Oregon hops of the previous year. Growers, however, obtained good prices for the 1909 crop, the average in California being $1s. 0\frac{1}{2}d.$ per lb.

Yield and Cost of Production.—The yield per acre is given by the United States Department of Agriculture as follows :—

Yield per acre in cwt.			
	1909.	1908	Ten-year average
New York	5'9	5'4	4'8
Washington	12'5	12'3	12'6
Oregon	7'6	8'5	9'1
California	11'6	12'5	11'8

In New York State, the system of cultivation is similar to that of Germany, the hop plantations being small and scattered and forming parts of larger farms. On the Pacific Coast, large areas are devoted exclusively to hops, the soil is rich and requires little manuring, the climate, rainfall, and absence of severe winds favour the growth of the bines, and until recently there has been immunity from blight and mould.

According to information supplied to the Hop Committee in 1908, the cost of production in New York State was £9 5s. per acre, which with a 6 cwt. crop per acre is equal to £1 11s. per cwt. To this must be added £1 15s. for picking and 9s. 6d. for curing, making the total cost £3 5s. 6d. or 7d. per lb.

In Oregon the cost of production is put at £11 8s., which with a 9 cwt. crop is equal to £1 5s. 4d. per cwt. Adding £1 5s. 6d. for picking, the cost would be £2 10s. 10d. per cwt., or $5\frac{1}{2}d.$ per lb. In California the cost of production appears to be still less, but Californian hops are said to be for the most part rank in flavour and to be less esteemed by brewers than those grown in Oregon.

The cost of transporting live stock by road and rail in the United States to the principal markets, and thence to the markets of the United Kingdom has recently been investigated by the **Cost of Transporting Live Stock and Meat.** Department of Agriculture in the United States,* and although the present cost cannot be exactly compared with the cost in earlier years it is considered that there has been an economy in several directions. In the first place the rail and ocean rates for carriage are less, and, in addition, the size and efficiency of the cars and vessels have been increased, while cheaper methods have been devised for handling traffic at the stock yards. One feature which has led to an appreciable saving is the reduction of loss in transit owing to mechanical improvements and legal regulations.

Another development in the same direction has been the transport of dead meat instead of live animals to a larger extent than was formerly the case. New slaughtering centres have been established nearer to the sources of supply than are the older meat-packing cities east of the Missouri River.

The average cost of transporting cattle from the grazing lands of Texas to Chicago was estimated in 1908 at from 32s. 11d. to 54s. 11d. per head. This included two distinct stages, the first of which involved an outlay of 13s. 3d. and covered the cost of driving from the farm to the local station, railway charges, food and attendance until the stock reached their destination in Montana or Dakota. Here they remain to be fattened, and when ready to be turned into beef are sent on by rail to Chicago. The cost for the journey from Montana or Dakota is estimated at from 19s. 8d. to 35s. 4d. per head.

Store stock are also commonly sent from Texas to feeding grounds in Kansas, Colorado and Oklahoma, and thence, after fattening, to Chicago, New York and London. The estimated cost of transport between each of these centres, including food and attendance, is given as follows:—From Texas to Kansas, 4s. 6d. to 14s. 3d.; from Kansas to Chicago, 18s. 5d. to 33s. 5d.; from Chicago to New York, 16s. 8d. to

* "Cost and Methods of Transporting Meat Animals," *Year Book of the Department of Agric. U.S.*, 1908.

18s. 4d.; and from New York to London, 40s. to 51s. 3d. per head.

The total cost of sending beef cattle from the feeding-districts of Kansas, Colorado and Oklahoma to London appears, therefore, to vary from £3 15s. to £5 3s., and the cost is practically the same when they come from Montana and Dakota.

The cost of carriage by sea cannot be so definitely ascertained as the railroad charges, as ocean freight rates are the subject of private contract, and are not usually made public. They were quoted in 1908 at from 25s. to 30s. per head for cattle and 3s. per head for sheep. The addition of the cost of attendants' wages, food for the stock, and incidental expenses may increase this amount by from 12s. 6d. to 21s. per head.

The high cost of transport of live animals naturally encourages the substitution for them of dead meat, which can be sent at a substantially lower rate, the total cost of shipping a live steer from Chicago to Liverpool being considerably more than double the cost of shipping the average weight of fresh beef yielded by the animal.

In continuation of the information given in previous issues* of this *Journal* as to the importation of live stock into Brazil, the following particulars furnished by

**Importation of Live
Stock and Machinery
into Brazil.**

Mr. Vice-Consul Causer, of Sao Joao d'El. Rey, are of interest.

With a view to assist the farmers to import animals, a contract was entered into by the Government of the State of Minas Geraes on October 22nd, 1908, with an English firm, Messrs. Hopkins, Causer and Hopkins, of Rio de Janeiro, for the supply of 1,065 animals of pedigree stock, this number being made up as follows:—Cattle: 814 Indian animals, 35 Swiss, 29 Lincoln Red Dairy Shorthorns, 2 Herefords, 5 Simmenthal, 1 Shorthorn, 7 Jerseys, 1 Oldenburg, 7 Holstein, 3 Ayrshire, 6 Devon, 3 Guernsey; Goats: 99 animals of various Continental races; Sheep: 14 Oxford Downs, and 20 of other breeds; Horses: 6 Bolognese and 1 Arabian

* Information as regards demand for live stock, &c., in Brazil has appeared in previous numbers of this *Journal* as follows:—August, 1907, p. 303; March, 1908, p. 738; April, 1908, p. 50; January, 1909, p. 275; April, 1909, p. 37, and September 1909, p. 485.

horse; and 9 head of poultry. These were duly delivered during 1909, and on September 30th, a new contract was signed with the same firm for the further supply of 530 Indian animals and about 200 European animals to be delivered during the year 1910. The conditions of these two contracts are specially favourable to the farmers, who have only to deposit the initial purchasing price in the country of origin, the State Government undertaking to pay all transport expenses, afterwards recovering the same from the Federal Government according to the laws respecting the importation of cattle for breeding.

The dairy industry, which has been for some years rapidly increasing, may now, with every confidence, be stated to be the chief business of the State and it would be difficult to find a single farm of any importance where a really modern dairy with up-to-date machinery does not occupy a prominent place.

The increased importation of agricultural implements into the State has been phenomenal. These goods come almost exclusively from the U.S.A., partly in consequence of the greater adaptability of the American implements. The American firms usually make very large consignments of ploughs and similar goods to some firm on the spot, sending with the goods an expert who travels through the country showing the method of working and seeing what alterations are advisable in existing patterns to suit local conditions.

The National Poultry Organisation Society have recently published a Report (price 1s.) by Mr. Edward Brown, F.L.S., on the Poultry Industry in Belgium, which is of considerable interest in view of the similarity of conditions in Belgium to those existing in the United Kingdom.

**Poultry Industry
in Belgium.**

Belgium is a densely populated country with a large home demand for food, so that, as is the case in the greater part of England and Wales, the producing districts are near to the consuming population, thus affording facilities for sale without transit over long distances. Belgium, however, differs from England in being practically self-supporting as regards eggs and poultry, and Mr. Brown observes that as an example

of what can be accomplished on small farms, Belgium, with her numerous and prosperous people, affords every hope that the increase of small holdings in Britain will enormously advance the relative food production of the country.

The various methods of poultry breeding and keeping adopted in Belgium, the breeds, the methods of marketing, &c., are described in detail, and without attempting to summarize the Report as regards these points, reference may be made to one or two subjects of special interest.

Improved Fertility.—Mr. Brown draws special attention to the improved fertility of the land owing to the keeping of poultry. The most noticeable instance of this is met with in what is known as the Campine district, which at one time was an arid sandy plain, covered with fir-trees and incapable of cultivation. About thirty years ago poultry-keeping was taken up by the peasants in this district on a somewhat extensive scale, and by the careful utilisation of the manure produced, much of the land has been so enriched that it has been brought into use for market gardening. Signs of prosperity, it is stated, are evident on all sides, both in the appearance of the people and their dwellings. The villages have grown considerably, and Mr. Brown observes that he has not met with “a more striking instance of the place occupied by poultry in respect to increasing the fertility of the soil and advancing the prosperity of the rural population.”

Milk Chickens.—The sale of milk chickens is very large during the early months of the year. They are produced exclusively in the egg districts, as the breeds which are used for larger table poultry are useless for this purpose, and are killed when eight weeks old. At this age they are naturally in a fleshy condition, weighing 8 to 10 oz. without any special preparation, except that for about two weeks the birds selected for killing are fed on soft food mixed with milk, which softens and whitens the flesh. They are in fact the cockerels of light-bodied, egg-producing breeds, which will never again, if permitted to grow, have much value for table purposes. At the age named they realise about 1s. 9d. each, whereas at twelve weeks old they are not worth more than 7d. The finest milk chickens are of the Braekel breed, Campines standing next, with Leghorns a bad third. One reason why the breeds

named are preferred is their rapid development and the fact that the sex can be distinguished by the comb much earlier than is the case with heavier breeds.

The production of these milk chickens is not a special industry, but is combined with the breeding of pullets for egg production; one great advantage it possesses is that it enables the cockerels to be sold at good prices, whereas they would otherwise be costly to feed and would ultimately realise low prices.

According to statistics published in 1906 by the Inspector-General of Forests in Switzerland, just over one-fifth part of that country is covered by woods, which is a high proportion when the area of mountain-land above the forest level is taken into account. This proportion naturally varies in the different cantons, ranging from 10½ per cent. in Uri to 40½ per cent. in Schaffhausen.

**Forestry Law in
Switzerland.**

The supervision of the woods and forests throughout Switzerland is governed by the provisions of the Federal Law of October 11th, 1902, and under this law forests, including wooded pasture land, are classed as (1) public forests, i.e., those belonging to the State, to communes, or to corporations, as well as those managed by a public authority; and (2) private forests, i.e., those belonging to private persons or to associations of private owners. Both these classes, again, are divided into "protective" and "non-protective" forests, the first category comprising those woods which, by reason of their situation, offer protection against damage from avalanches, ice, floods, &c. In accordance with this Federal law, most of the cantons have made laws to regulate the forests within their own areas.

As an example of this class of legislation, some of the provisions of the Forestry Law of the Canton of Vaud may be given. In the first place, it is provided that the forest area of the canton, whether public or private, is not to be decreased without authority, and clearings of all kinds are to be replanted within three years. Complete clearings may only be made with the consent of the Department of Agriculture, and cuttings exceeding 20 cubic metres require the

permission of an inspector, as do also the cutting of shelter belts and cuttings likely to be injurious to the growth and renewal of the forest. Periods of cutting and removal of wood are defined.

The Department of Agriculture is instructed to secure the afforestation of land with a view to its conversion into a "protective" wood, and if necessary the State Council can require the creation of such woods. The management of a privately-owned wood of this type is subject in almost all matters to the approval of the Forestry Inspector, and here complete fellings are usually prohibited, though exceptionally permission may be given subject to replanting being immediately undertaken.

With regard to the public forests, it is laid down that they are to be managed on a systematic plan with a view to their conservation, and the Department of Agriculture regulates the work to be done annually.

One interesting feature of the Swiss laws provides for the formation of associations of private owners of woods in cases where the land belonging to individual proprietors is much divided into small lots. It is contemplated that the management of such woods grouped together should be undertaken by the forest staff of the canton without expense to the owners, and where such woods come under the heading "protective," the State Council may require their treatment in groups in this way. The expenses of the allotment, surveying, &c., are paid by the Federal Council. Up to the present only two small areas have been proposed for treatment in this manner, and in neither case has the project been finally completed.

The question of a possible shortage in the timber supply has of late attracted some attention in the United States, and the Department of Agriculture has

The Timber Supply of the United States. accordingly issued a Circular (*Forest Service, No. 166*), which gives such information as is available as to the extent of the forests, their ownership, the rate at which they are being cut, and the outlook for the future. The data have been drawn from every available source, but are admittedly incomplete.

The forests are divided into two great groups, *the Eastern* (including the Northern, the Central Hardwood, the Southern, and the Tropical forests), and *the Western* (including the Pacific Coast and the Rocky Mountain forests). The following table gives a comparison between the present and the original forests.

Region	Original forest		Present forest			
	Area Million acres	Stand Billion feet	Area Million acres	Stand Billion feet	Per cent of original area	Per cent of original stand
Northern	150	1,000	90	300	60	30
Southern	220	1,000	150	500	68	50
Central	280	1,400	130	300	46	21
Rocky Mountain	110	400	100	300	91	75
Pacific	90	1,400	80	1,100	89	79
Total	850	5,200	550	2,500	64	48

The figures show that the "stand" has, in every instance, decreased in greater proportion than the acreage, or in other words the biggest and best timber has been removed.

With regard to "stumpage" estimates of different species, Douglas fir comes first with 525 billions of board feet, followed in order by Southern yellow pine (350 billions), Western yellow pine (275 billions), redwood, Western hemlock and Western cedar 100 billions each. Hardwoods total 500 billions, and the total for all species is estimated at 2,500 billion board feet. The timber cut in 1907 exceeded 20 billion cubic feet, with a value for forest products of \$1,280,000,000. Nearly three-fifths of this value was made up of lumber, shingles and laths, and about one-fifth of firewood.

Southern yellow pine supplied 13 billions of board feet of the lumber, Douglas fir $4\frac{1}{2}$ billions, white pine 4 billions, oak $3\frac{1}{2}$ billions, and hemlock $3\frac{1}{2}$ billions. The supply of white pine has decreased from $8\frac{1}{2}$ billion feet in 1890 to 4 billions in 1907, while the supply of yellow pine promises to give out in the next fifteen years at the present rate of cutting. On the other hand, the output of Douglas fir is increasing rapidly. The total hardwood cut in 1907 was $9\frac{1}{2}$ billion feet, made up of 40 per cent. oaks, 10 per cent. maple, 7.9 per cent. yellow poplar, 7.5 per cent. red gum, and others.

The total lumber production has increased from 18 billion board feet in 1880, to 23½ billions in 1890, 35 billions in 1900, and 40½ billions in 1907, the total being 768 billions for the period 1880-1907, or practically one-third of the amount of timber at present standing in the United States.

Diagrams are given in the Circular above referred to showing the manner in which lumber companies have been forced to turn to the forests of the South and West on the cutting out of the virgin timber in the North and East.

In estimating the future supply, the forest area of 550 million acres is considered to consist roughly of 200 million acres of mature forests in which growth is balanced by death and decay, of 250 million acres partially cut or burned over on which, in time, a partial crop of marketable timber may be obtained, and 100 million acres of more severely cut and burned-over forests in which there is not sufficient young growth to produce a new crop. The average annual growth for the whole is put down at 12 cubic feet per acre, or a total of not more than 7 billion cubic feet per year. In other words, the forests are being cut three times as fast as they are growing.

Such unrestricted exploitation cannot continue. White pine, which was once considered inexhaustible, has fallen off 70 per cent. in cut since 1890, and 45 per cent. since 1900. Oak has decreased 16 per cent. since 1900, and yellow poplar 22 per cent.

The conclusion arrived at is that on 450 million acres (allowing for the absorption of a further 100 million acres of forest land for agricultural purposes), under proper forestry conditions, enough timber can be produced for the needs of a much greater population than at present exists in the United States. To bring about this state of affairs greater economy in use must be observed (the present annual consumption is 250 cubic feet per head, against 37 cubic feet in Germany), and vigorous co-operation between the National Government, the States, and individual forest owners is recommended. Most of the U.S. forests are privately owned, either as farmer's wood lots or as large holdings, either individual or corporate. The public forests contain more than 100 million acres of sawn timber, and comprise approximately 20 per cent. of the standing timber.

SUMMARY OF AGRICULTURAL EXPERIMENTS.*

FRUIT, CIDER, AND HOPS.

Grafting and Pruning Fruit Trees (National Fruit and Cider Inst., Report, 1908).—The comparative merits of the "Hereford" and "Somerset" systems of growing standard cider trees is being investigated. According to the "Hereford" system the tree is worked in the usual way at the base of the parent stock in the nursery, with the variety intended to be grown permanently, while in the "Somerset" system a well-grown tree of a strongly growing variety is planted in its permanent position in the orchard, and allowed to produce a good well-balanced head, which afterwards is cut back and worked on each main branch with the selected vintage variety.

Trials of the two systems are being carried out in alternate rows and annual measurements of the trees have been made, with the result that the "Somerset" method of treatment causes a decided check in development, temporarily at any rate. Taking by far the most favourable case for the latter system, that of six Morgan Sweet trees head-worked with Reinette Obry, Cremiere, and M. Jacques, in April, 1905, this being one year after planting, the average comparative size for the six trees in March, 1909, was 173, as against 100 in March, 1906, whereas the average for all trees under the "Hereford" system was 186 in March, 1909, as against 100 in March, 1906; while the average for all trees, 70 in number, under the "Somerset" system was only 134 in March, 1909.

It should be stated that the time of re-grafting the "Somerset" trees appears to make a considerable difference to the extent of the check sustained by the trees. Almost invariably the trees grafted in 1905, *i.e.*, one year after planting, suffered decidedly less check than those not worked until 1906. This matter is to be further investigated.

The experiments on the pruning of apple and pear bushes have only been in progress a short time. Twelve varieties of apples and four varieties of pears are being pruned according to various systems. The bushes are still quite young but the yield of fruit in 1908 furnished some interesting results. Light pruning resulted in a larger yield than severe pruning for every variety except two (Allington Pippin and William's Bon Chrétien), and the total yield of these was too small for comparative purposes. Of the varieties that produced good crops only one (Stirling Castle) failed to show a decided balance in favour of light pruning. There was an appreciable advantage as regards yield and quality of apples from root pruning in the case of some varieties, but others were severely checked in growth by it.

* The summaries of Agricultural Experiments which have appeared in the present volume have been as follows:—Experiments with Cereals, April, p. 65, and May, p. 150; Experiments with Root Crops, June, p. 239, and July, p. 311; Experiments with Potatoes, July, p. 313, and August, p. 402; Miscellaneous Experiments, August, p. 405, and September, p. 489; Experiments with Clover and Grass, October, p. 589; Experiments with Live Stock, November, p. 660; Experiments with Milk, Butter, and Cheese, December, p. 573; Weeds and Fungus Diseases, January, 1910, p. 854; Weeds, Insects, and Fungi; and Fruit and Hops, February, 1910, p. 953.

Pruning Apple Trees (Harper Adams Agric. Coll., *Field Experiments, Report*, 1908).—Trees that were unpruned were found, both in 1907 and 1908, to form more fruit buds than pruned trees, especially in the case of Cox's Orange Pippin. The average increase in diameter of stem of unpruned trees is less than that of those pruned regularly.

		Average diameter in inches at 4½ feet above ground.	
		Unpruned trees.	Pruned trees.
Cox's Orange Pippin ...	...	2'06	2'44
Bismark ...	...	2'25	2'55
Bramley's Seedling ..	..	2'42	2'78

Strawberry Runner Experiments (National Fruit and Cider Institute, *Report*, 1908).—Trials of the relative cropping qualities of the "first" and "second" runners of strawberry plants were started in 1906. By the term, "first" runner, is meant the first runner produced from parent plant on a given stem, while the "second" runner is the next produced on the same stem. The crops for 1907 were small, the plants for the first season not being particularly strong, although, as might be expected, the "firsts" were the larger. In 1908, the yield was fair, considering the nature of the season; and the plants of the two groups were more even in size and strength. In the two years the total yield for five varieties from the "first" runners was 713 lb., and from the "second" runners 607 lb.

The assertion by some growers that the "second" runners produce larger crops has thus not been supported by the results for the first two seasons, although possibly the third season's crop may result differently, since the "seconds" were originally the more backward plants, and may, therefore, take longer to reach full vigour.

Yield of Strawberries over a number of years (Worcester C. C., *Thirteenth Report on Droitwich Experimental Garden*, 1908).—A record has been kept of the yield of a number of plants of three varieties over ten years. Good crops were obtained in some of the later years.

Protection of Fruit against Frost by Smudging (*Jour. of South-Eastern Agric. Coll.*, No. 17, 1908).—Owing to the absence of severe frosts it was impossible to test the effect of smudging, but some progress was made in discovering the best method of arranging the apparatus and in estimating the cost. The method employed was that of making a hot black smoke by burning a mixture of naphthalene and creosote in the iron pots recommended in an article in the *Journal of the Board of Agriculture*, April, 1907 (p. 23), forty pots being used to the acre. It was found that lighting up forty pots took one man about twenty minutes. If the pots are lit up early, as appears to be necessary, and the frost continues till sunrise, it is necessary to relight them, and the refilling and relighting of forty pots took three men a considerable time. The dense black smoke did not scorch the bushes but those near the pots were covered with black smuts. These washed off after a few days' rain, but smudging would be impracticable if early rhubarb or other low-growing plants and vegetables nearly ready for market were grown between the rows, or where the plantation is close to houses. The cost, including labour, five acres being done at a time, is estimated at 25s. 4d. per acre. If a refill is necessary the cost would be about 22s. more.

*Various Experiments with Fruit Trees (Worcester C. C., Thirteenth Report on the County Experimental Garden, Droitwich).—*Manuring of Apple and Pear Trees.—Trees have been manured for five years with (1) stable manure at the rate of 16 tons per acre, supplemented by inorganic manures, (2) stable manure only, (3) garden refuse only, and (4) inorganic fertilisers only. The total fruit produced in five years by two trees in each case has been as follows:—(1) 635 lb.; (2) 438 lb.; (3) 344 lb.; and (4) 192 lb. Pear trees treated in the same way gave (1) 49 lb. large size; (2) 50 lb. large size; (3) 24 lb. medium size; 13 lb. medium size. Plum trees yielded as follows (4 years):—(1) 293 lb.; (2) 264 lb.; (3) 134 lb.; and (4) 25 lb.

Pruning.—In a comparison between pruned and unpruned apple trees, the properly pruned trees continue to give distinctly the finest fruit, and are rapidly overtaking in fruitfulness the slightly pruned and unpruned trees. Similar results were obtained from pear trees in 1908.

In the case of plum trees, spur pruning is considered detrimental.

*Fruit Bottling (Worcester C. C., Thirteenth Report on Droitwich Experimental Garden, 1908).—*Thirty-three varieties of plums were sterilised at various temperatures, and the condition and appearance of the fruit after several months are stated.

*The Rate of Fermentation of Ciders and Perries (Jour. Agr. Science, Vol. III., Pt. I., December, 1908).—*This paper discusses the relation between the rate of fermentation and the variety of apple used, the chemical composition of the juice, the yeasts present, aeration, and temperature. It is concluded that the main factor in determining the rate of fermentation is the nitrogenous matter present in the juice, which is assimilable by the yeast. There is probably a relation between the rate of fermentation and the variety of fruit. Certain varieties yield juices that ferment slowly, while others give juices that generally ferment at a rapid rate. The state of ripeness of the fruit at the time of milling also affects the rate of fermentation, which becomes slower until a certain point of ripeness is reached, and afterwards increases as ripeness proceeds to decay. Direct influence on the rate of fermentation by any of the chemical constituents of the juice, other than the nitrogenous substances, was not observed. Aeration has a marked effect, the admission of air producing a decided increase in the rate, while the temperature at which the fermentations are conducted affects the rate in the customary manner.

Mr. Barker observes that apart from such methods as filtration, "a certain measure of control over the rate of fermentation of ciders and perries can be exercised by the cider maker, and therefore the production of sweet and dry types of these beverages need not be more or less haphazard, as is commonly the case. By careful selection of the varieties of fruit used, and by suitable blending of various types, combined with attention to the condition of ripeness of the fruit at the time of making, it should be possible to obtain a juice possessing the desired rate of fermentation, although some allowance for seasonal influences is necessary. . . . During the course of fermentation of the liquors the rate may be controlled to some extent by aeration and temperature."

*The Yeast Flora of Bottled Ciders (Jour. Agr. Science, Vol. III., Pt. I., December, 1908).—*The yeast flora of five samples of bottled

cider made at the National Fruit and Cider Institute were examined. This was a section of an investigation of the organisms concerned in the fermentation of cider with a view to the improvement of the process, *e.g.*, by the use of selected yeasts. Three of the samples were made from Sweet Alford apples only, each lot from a different district of Devon. The other two samples were made from Kingston Black apples only, one lot from Devon and the other from Somerset. From the five samples thirteen different yeasts were isolated, of which two occurred in two varieties. As far as the results go they afford no support to the ideas that certain yeasts may be regularly associated with certain apples, or that the fermentations in a cider factory may be carried on mainly by any group of yeasts with a regular habitat there. The results also give no support to the idea that certain yeasts may be specially prevalent in one season and may dominate the fermentations in that season, while others may fill their place in other seasons. Since the various lots of fruit came from different localities, nothing definite can be said as to whether the yeast flora of the ciders was in any way representative of the yeast flora of the district in which the fruit was grown. Such may have been the case, but failing that there seems no other obvious source to which to look for an explanation of the character of the yeast flora of ciders. The five samples examined had floras so diverse that it is clear that the fermentation of cider in the ordinary manner is most uncertain in character.

Experiments with Hops (*Jour. South-Eastern Agric. Coll.*, No. 17, 1908).—A paper by Messrs. E. S. Salmon and Arthur Amos gives the results of an investigation into the value of the Male Hop.

It is shown that it is only when a certain number of the bracteoles of the hops bear seeds that the hops "grow out" properly, and in order for seed to be produced it is absolutely necessary for the flower which grows at the base of each bracteole to be fertilised by pollen dust from a male hop.

The amount of resins (lupulin) contained in seeded and seedless hops was also investigated and it was found that the effect of fertilisation was to increase the amount of resins.

A beginning has also been made since 1906 in the breeding of improved varieties.

POULTRY.

Use of Charcoal in Fattening Ducks and Geese.—The Board have been furnished by Mr. H. de Courcy with an account of some experiments carried out by him for the purpose of deciding the exact value of charcoal as a means of keeping birds that are closely confined during fattening in good health.

Eighteen large healthy Aylesbury ducklings were selected from a large flock and divided into three pens, each pen containing six ducklings of as uniform weight as possible. Each batch of six ducklings weighed fifteen pounds, or an average of two-and-a-half pounds per head.

Throughout the experiments the ducklings were fed upon foods which previous experiments had shown to be profitable and economical, namely, boiled potatoes, barley meal, ground oats, skim milk, and tallow greaves. The method of preparing the food was to boil, strain,

and pound up the potatoes, which before boiling would constitute about one-third by weight of the mash. Barley meal and ground oats were then mixed in equal parts and mixed with the potatoes. Skim milk was added to form a rather wet mash. This was fed to the ducklings from the end of the fifth to the beginning of the ninth week. During the last two weeks of fattening, animal food in the form of rough fat or tallow greaves was added to the mash, the allowance being about two ounces per day to each duck. Grit and water for drinking were liberally supplied. Apart from the charcoal the food received by all the ducklings was the same.

Pen No. 1 was allowed no charcoal, Pen No. 2 was given an unlimited amount of rough charcoal, while in the case of Pen No. 3 powdered charcoal was mixed with the mash at the rate of one-fifth charcoal to four-fifths of the other ingredients, the charcoal being thoroughly incorporated with the meals before they were moistened. The results are shown in the following table.—

TABLE NO. 1.—DUCKS.

Pen	Number of Ducks in pen	Weight at 6 weeks old	Weight at 8 weeks old	Weight at 10 weeks old	Increase in 4 weeks	Increase per head in 4 weeks
No. 1 (no charcoal).	} 6	lb oz 15 2	lb. oz 21 6	lb oz 23 0	lb oz 7 14	lb oz. 1 5
No. 2 (rough charcoal)		15 0	24 8	27 2	12 2	2 0
No. 3 (charcoal mixed with the food).	} 6	15 0	25 8	27 14	12 14	2 2

The trials show that charcoal in one form or another is essential in the profitable fattening of ducks. It appeared to keep the ducklings healthy, and enabled fattening to be continued with profit for a much longer period than when charcoal was not allowed.

Pen No. 1, which was allowed no charcoal, made most gain in weight from the sixth to the eighth week, and made but a slight gain from the eighth to the end of the tenth week, whilst the two charcoal-fed pens kept on increasing satisfactorily all the time whilst they were being fattened. Mixing the charcoal with the food appears to be the better system of feeding, but the slight increase in weight of Pen No. 3 over Pen No. 2 would scarcely pay for the extra cost of grinding and mixing charcoal with the mash, as compared with feeding it alone and in rather coarse condition.

The experiments with geese were conducted on similar lines and gave almost identical results, as shown in the following table. The breed was the Embden-Toulouse. The foods fed to the geese were the same as those fed to the ducks, except that they got steeped oats

instead of mash for the evening meal, mash being fed in the morning. Pen No. 1 received no charcoal, Pen No. 2 had charcoal in a trough, and Pen No. 3 one-fifth charcoal in the mash.

TABLE NO. 2.—GESE.

Pen	Number of Geese in pen	Weight at 14 weeks old	Weight at 16 weeks old	Weight at 18 weeks old	Increase in 4 weeks	Increase per head in 4 weeks
No. 1 (no charcoal)	6	lb. oz. 50 0	lb. oz. 56 8	lb. oz. 59 2	lb. oz. 9 2	lb. oz. 1 8
No. 2 (rough charcoal).	6	49 10	60 4	65 8	15 14	2 10
No. 3 (charcoal mixed with the food).	6	50 2	62 0	66 12	16 10	2 12

The charcoal fed to both ducks and geese was burnt wood, broken fine.

Poultry-Keeping for Egg Production (Aberdeen and N. of Scotland Coll. of Agr. Bull. 14.)—The object of this experiment was to ascertain the extent to which poultry-keeping for egg production could be profitably conducted by farmers, cottagers, crofters, and cottars. With this aim in view, eight flocks of White Wyandottes, each consisting of nine pullets and a cockerel, were purchased, and also two similar flocks of White Leghorns. These varieties were selected in consequence of their high reputation for laying qualities, and they were obtained from the most reliable sources of utility fowls.

Eight of these flocks or colonies were distributed on farms and kept on the colony system. The fowls were accommodated in movable houses, and had unrestricted range. The remaining two flocks were kept under conditions applicable to the fowls of cottagers and suburban poultry-keepers. Their range was restricted, and situated chiefly among shrubs and trees.

A separate report is given for each colony showing the number of eggs for each month during the year over which the experiment extended, and the price actually obtained for them. In the hatching season those conducting the experiments had a demand for eggs for setting, and they sold them for this purpose at 3s. 6d. a dozen, as a rule. The average number of eggs per hen for the year was 150.8, the maximum being 175 and the minimum 117. The average excess of price actually received for eggs over cost of food was 14s. 0½d. per hen. Had all the eggs been sold at the same rate as those sold in Aberdeen, the excess of the price over cost of food would have been 10s. 11½d. per hen.

The Wyandottes did very well, the average number of eggs ranging from 150 to 175 per hen, and they continued to lay right through the moulting period. The Leghorns were not so satisfactory, but it is thought that they may do better in future as they become acclimatised.

An interesting feature was the good results obtained by the birds in partial confinement. The total number of eggs laid was 1,514 in one case, and 1,355 in the other, there being nine hens in each case.

A trap nesting experiment is also being conducted in order to ascertain the laying qualities of individual hens. The number of eggs laid by eight fowls in nine months represented an average of 159 per annum, and the intention is to mate up those that lay 170 eggs and over with a male bird, pedigree-bred from the best available laying strain, and from this mating to found a race of pedigree layers.

Egg Records of Leghorn Fowls (Illustrated Poultry Record. Vol. I., No. 6, March, 1909.)—The object of this experiment, which was conducted at the College Poultry Farm, Theale, Reading, was to test the various types of Leghorn fowls. The following fowls were compared:—(i.) nine Danish Brown Leghorn 1907 pullets, (ii.) fifteen Danish White Leghorn 1907 pullets, (iii.) twelve Danish White Leghorn 1906 hens, (iv.) four American White Leghorn 1906 hens, (v.) four English exhibition White Leghorn 1906 hens. The English Leghorns weighed on the average 5 lb. each, while the average weight of the other types varied from 3 lb. 3 oz. to 3 lb. 9 oz. During the year 1908 the average number of eggs per hen or pullet for the different types was as follows:—(i.) 154, (ii.) 145, (iii.) 140, (iv.) 142, (v.) 76. It should be noted that the number of hens in the various lots was very unequal. In the case of the English exhibition breed 33 per cent. of the eggs were below 2 oz. in weight; of the others only 2 per cent. or less.

The results confirm the view that the breed is not a good winter layer. In this respect the Browns came out best, laying an average of 24 eggs during the five months October–February; the average of the White Danish pullets was 15, while the remaining lots were very unsatisfactory.

Various Poultry Experiments (Cornwall C. C., Notes on Agric. and Poultry Expts., 1905 and 1906.)—This report gives the results of a number of trials carried out in 1905 and 1906 on the comparative value of wheat, maize, barley, and oats, the effect of mixing foods, the weight of food consumed by various varieties of fowls, comparison of mixed grain and warm barley meal as a morning food, the value of scratching sheds, the effect of allowing pullets to rear two broods of chickens, first crosses, and laying hens in their sixth season.

Ventilation of Poultry Houses (Jour. of South-Eastern Agric. Coll., No. 17, 1908.)—The ventilation of poultry houses is a matter of vital importance to poultry keepers, since overcrowding is known to impair the vitality of the birds, to render them susceptible to numerous diseases, including tuberculosis, diphtheritic roup, &c., and to diminish the number of eggs produced in winter.

An investigation into these points was carried out by Dr. Russell, and measurements were made of the amount of air required by poultry and the amount of impurity produced in poultry houses. Preliminary inquiry showed that 40 cubic feet of air per hour might be regarded as a suitable air allowance for poultry, but this must be supplied at a suitable rate to prevent draughts.

Two houses were put up so arranged that each bird was getting about 40 cubic feet per hour, but in one the air was changed five times and in the other nine times per hour. The number of eggs laid was

taken as an index of the well-being of the birds, which had been very carefully selected to secure equality, and the result showed that in 15 weeks the hens in House No. 1 laid an average of 38·8 each, while those in No. 2 laid only 28·5 each. The birds therefore did better when the air was changed only five times per hour, and the difference is attributed to the smaller loss of heat by the birds, which shows itself in production.

It is concluded, therefore, that it is desirable that each bird should be allowed 40 cubic feet of air per hour, and that this 40 feet should be supplied at a reasonably slow rate. Under conditions known by experience to be favourable to the birds, the air changes in a large house four times, and in a small house five times, per hour, which appears to be a very suitable rate.

Dr. Russell observes that it is clearly impossible for the practical man to test the air in his poultry houses and ascertain the amount of carbonic acid present, nor is there any necessity to do this, because, under similar circumstances, the amount does not show a very great variation. The above conditions are all fulfilled in houses of a more or less cubical shape and also in the low types of house, when (a) there is a floor allowing a certain amount of air to enter from below, *e.g.*, bricks about a quarter-of-an-inch apart covered with peat moss, or spaced boards if the floor is of wood; (b) there is top ventilation, two inches being open under the eaves of a high house, or a few large holes bored in the sides of a low house; and (c) each bird is allowed ten cubic feet of space.

Cost of Rearing Ducklings (Univ. Coll., Reading, Agric. Dept.)—A trial was carried on in 1908 to ascertain the cost of rearing ducklings up to nine weeks old, and was reported in this *Journal*, December, 1908. The average cost was found to be about 1s. 5½d.

DISEASES OF LIVE STOCK.

Causation and Spread of Anthrax (Aberdeen and N. of Scotland Coll. of Agric. Bull. 9.)—The prevalence of anthrax in the county of Aberdeen suggested an inquiry into its causation and spread, and the information obtained during four years is contained in this report. The conclusion arrived at by Mr. McLauchlan Young is that anthrax occurs more frequently in sheep than is generally known, and is more likely to appear in feeding sheep than in hill or wintering sheep. The disease, moreover, is seldom looked for in sheep, and precautions are seldom taken in disposing of the carcasses of animals that have died, so that there are many opportunities for the infection of other animals. Mr. Young makes, in this connection, some suggestions as to precautionary measures.

Diseases of Sheep (Journal of South-Eastern Agric. Coll., No. 17, 1908.)—Experiments have been carried out by Mr. T. W. Cave, F.R.C.V.S., with cultures of the braxy and louping-ill organisms dealt with in the Report of the Departmental Committee of the Board of Agriculture on those diseases. These cultures were employed by Mr. Cave with a view to protecting the sheep of Romney Marsh against the attacks of the "struck" organism, but no conclusive results were obtained.

Mr. Cave also records an investigation into the nature and cause

of "sway-back" in lambs, and gives an account of some parasites of the fourth stomach and intestines of sheep and cattle.

MISCELLANEOUS EXPERIMENTS.

Reports on Analyses (Jour. Roy. Agr. Soc., Vol. LXIX., 1909; Trans. Highland and Agr. Soc., Fifth Series, Vol. XXI., 1909; Jour. Bath and West and Southern Counties Soc., Fifth Series, Vol. III., 1908-9; Harper Adams Agr. Coll., Field Expts., Report, 1908; South-Eastern Agr. Coll., Wye, Jour. No. 17, 1908.)—These publications contain observations by the consulting chemists and botanists on samples submitted for analysis.

In the Journal of the Royal Agricultural Society of England an analysis is given of a sewage sludge containing 11·68 per cent. of organic matter (containing nitrogen 38 per cent.) and 73 phosphoric acid (equal to 1·60 per cent. phosphate of lime). This was used to advantage on heavy clay land in Essex, making the land work well and being useful for peas, beans, oats, and wheat. It was found, however, not to do well with potatoes on light land, the tendency being for the potatoes to become scabby.

Reference is also made to the question of magnesia in soils, in regard to which experiments are being conducted at the Woburn Pot Culture Station.

Investigations into Maize and Maize Silage (Jour. of the South-Eastern Agricultural College, No. 17, 1908.)—A report by Dr. E. J. Russell gives the results of investigations undertaken from 1901 to 1907 on maize and maize silage. It was ascertained that large crops (from 15 to 30 tons per acre) of green maize could be produced without difficulty in Kent and Surrey. The crop is smallest in cold wet seasons, and largest in hot dry ones, but the seed need not be sown till June, so that it can be put on to land where swedes or mangolds have failed. It is therefore well worth a trial where succulent fodder is wanted in September and early October.

The changes occurring when maize is converted into silage were investigated, and a summary is given of the general conclusions arrived at. As regards the practical side of the question, Dr. Russell observes that maize silage is quite a useful food, though inferior to swedes and mangolds. In the process of manufacture there is a certain deterioration and a loss of dry matter, which was found to vary between 30 and 40 per cent., and to fall mainly on the valuable nitrogen free extract and protein, and least on the worthless fibre. The loss might be reduced in a better silo than the one available at Wye, but the deterioration cannot be avoided. It hardly appears worth while to grow maize for the production of silage except where mangolds are unusually costly.

Investigations on Farmyard Manure (Journal of South-Eastern Agric. Coll., No. 17, 1908.)—An inquiry has been made by Dr. Russell into the following points:—(1) The amount of unavoidable loss in making dung; (2) whether a high-grade linseed cake (*i.e.*, one rich in oil) gives better dung than one poor in oil; (3) the relative values of straw and peat moss, and of straw and fern, for litter.

The conclusions arrived at are summarised as follows:—

Dung made in a box under bullocks receiving linseed cake and a sufficient amount of litter was found to have lost 15 per cent. of its

nitrogen during the process of making. Every precaution possible in practice was taken to guard against loss. This result agrees so closely with that obtained by other English and German investigators that it must be regarded as an inevitable part of the process.

The loss is more serious than it appears, for it falls entirely on the quickly available nitrogen compounds; there is also a further loss, since some of these compounds are taken up by micro-organisms and converted into slowly available and less useful substances. No method can be suggested whereby these losses can be obviated.

In making dung peat moss is much better than straw as litter, because of its greater power of absorbing and retaining the soluble nitrogen and potash compounds of the urine. But it decomposes less rapidly in the soil, and on light soils peat moss dung may be less useful than straw dung, especially in dry seasons.

Bracken is a useful material for litter, being nearly as good as straw, but the resulting dung is more useful on heavy than on light soils, because it decomposes less rapidly than straw-made dung.

It was found that a linseed cake poor in oil produces better dung than a high grade linseed cake, since it contains a larger amount of protein.

The Composition of Brewers' and Distillers' Grains (Edin. and East of Scotland Coll. of Agr. Bull. XVI.)—This report gives a number of analyses of wet and dry grains, and discusses the variations in their composition and the difference between distillers' and brewers' grains.

The Effect of Partial Sterilisation of Soil on the Production of Plant Food (Jour. Agric. Science, Vol. III., Pt. 2, Oct., 1909).—This is a report by Dr. E. J. Russell and Dr. H. B. Hutchinson. When soil is partially sterilised it is found to become more productive, and these investigations were undertaken to ascertain the cause of this productiveness. Partial sterilisation of soil was effected in three ways:—(1) By heating to 98° C.; (2) by addition of 4 per cent. of toluene, which at the end of three days was allowed to evaporate by spreading out the soil in a thin layer; (3) by the same amount of toluene left in the soil during the whole of the experiment. The results are summarised as follows:—

(1) The increased productiveness of partially sterilised soils is due to an increase in the amount of ammonia present.

(2) The excess of ammonia is the result of increased decomposition of soil substances by bacteria.

(3) Hiltner and Stormer's discovery that the bacteria increase rapidly after partial sterilisation, and finally become much more numerous than in the original, untreated soil, is confirmed. The increase in number proceeds *pari passu* with the increase in ammonia.

(4) The new bacterial flora arising after partial sterilisation is a more potent decomposing agent than the original flora, but the individual species have not become more, but apparently less potent. The increased decomposing power of the new flora is associated with its numerical superiority over the old flora.

(5) The rates of decomposition and of bacterial increase in the toluened soil were found to be adversely affected by the addition of the original untreated soil. The original soil, therefore, contains some factor which limits bacterial action.

(6) Chemical hypotheses were found unsatisfactory; the factor is considered to be biological. Large organisms (*protozoa*) were found in the untreated, but not in the partially sterilised soils, and at least two of these organisms are known to destroy bacteria.

(7) These large competing and destructive organisms are killed by heat and most of them by toluene, and can then serve as food for bacteria. In both these directions the effect of partial sterilisation is beneficial.

(8) As the effect of partial sterilisation in increasing productiveness is shown on so many soils, and apparently always in the same way, it may be expected that these competing and destructive protozoa are of common occurrence and constitute an important factor in soil fertility.

(9) In relation to plant growth, partially sterilised soils are peculiar in that they supply not nitrate, but other nitrogen compounds such as ammonia, to the plant. The nitrifying organisms will develop if they get into the tolued soil, but they did not work in heated soils. This difference in the course of nitrogen nutrition may be correlated with the difference in nitrogen content of the plant and in the character of growth.

Further investigations are in progress.

Soil Investigations (*Journal of South-Eastern Agric. Coll.*, No. 17, 1908).—A summary is given of some investigations by Dr. Russell into the absorption of oxygen by soils.

The Use of Virus for Extermination of Rats (*Aberdeen and N. of Scotland Coll. of Agr. Bull.* 12).—This bulletin contains the results obtained with the Liverpool Virus, the Danysc Virus, and Ratin on three areas that were much infested with rats.

The Report of the Select Committee on the Hop Industry contains certain recommendations whereby hop growers in this country might be supplied with information regarding the industry abroad. It was stated in the House of Commons on the 17th December, 1908, that the Board of Agriculture and Fisheries recognised the importance of the subject and that proposals were under consideration with a view to give effect to those recommendations as far as possible.

Foreign and Colonial Legislation relating to Hops.

One direction in which action has been taken has been to obtain information as to the legislation relating to the cultivation and marketing of hops, and a brief statement of the position in various countries is given below.

Austria.—The marking of hops is regulated by a law of which a *résumé* was recently published in this Journal (Vol. XVI., p. 34). There is no special legislation regarding the actual cultivation of the crop.

Belgium.—The only law dealing with the cultivation and sale of hops is a Decree of the 3rd May, 1887, which forbids planting or the existence of male hop plants in hop gardens. Male hops are not permitted within a radius of 100 metres, and their eradication by the landowner is compulsory. Local enactments exist in the two principal Belgian hop districts, viz., the communes of Alost and Poperinghe. These regulations refer to the examination of the hops by experts who

issue certificates as to origin, quality, &c., and each bale is duly sealed by means of a distinctive label.

Germany.—There are no Imperial laws or regulations of any kind relating to the cultivation or marketing of the hop crop, but legislation exists in Bavaria, which is the principal district in Germany where hops are produced. Under the terms of a Royal Decree which came into force on the 1st July, 1862, any person who sells sulphurised hops, either pure or mixed with unsulphurised hops, must expressly declare this nature of the goods to the purchaser, or he must make the fact generally known by affixing to each package a certain sign which is prescribed by law. Infringements are punishable by fines not exceeding 150 marks. The Bavarian legislation does not prescribe the marking of hops according to their place of origin, but in certain districts authority exists to affix to the goods certain seals, which, to a great extent, indicate the origin of the better kinds of Bavarian hops.

New Zealand.—The Government is authorised by the Produce Exports Act of 1908 to institute compulsory grading, but the law has not yet been put into operation.

No legislation exists in France, Russia, the United States of America, Canada, Victoria, or Tasmania.

As regards the use of hop substitutes, legislation may be briefly summarised as follows:—

Germany.—The use of hop substitutes in the manufacture of beer is prohibited in Bavaria, Wurtemberg, Baden, and Alsace-Lorraine.

Australia.—There is no special legislation dealing with the subject, but it is unlawful to import "hop aromas, hop bouquets, hop extracts, hop flavours, hop oil, and any articles of a like nature, and of any substitutes for or imitations of any such articles, whether simple or compounded in any manner with other material, and being capable of use in the making of beer, or in any brewing process, or for addition to beer."

Canada.—The use of hop substitutes is restricted by the "Adulteration Act" of the Dominion which prohibits the addition to potable liquors of articles such as picric acid, strychnine and *Cocculus indicus* which have been employed, or are capable of being employed, as substitutes for hops. The only Provincial law which also contains restrictions is the Liquor License Act of Ontario.

Cape Colony.—The law provides for the flavouring of beer with hops only, and the use of any substitute is illegal.

No legislation on this subject exists in Natal, the Orange River Colony, the Transvaal, Newfoundland, or in New Zealand.

IMPORTATION AND OTHER REGULATIONS.

Importation of Live Stock into Canada.—An Order-in-Council, dated 30th November, 1909, has been issued which rescinds the previous Order-in-Council of 14th January, 1907, together with all amendments thereto, and substitutes amended regulations in lieu thereof.

These amended regulations provide, *inter alia*, that persons contemplating the importation of animals into Canada from any part of the world (except the United States and Newfoundland) must first obtain a permit therefor from the Canadian Minister of Agriculture.

The importation, by sea, into Canada of animals from all countries (other than the United States, Newfoundland, and Mexico), is prohibited, except at the following ports:—Victoria, Vancouver, Quebec, St. John, Halifax, and Charlottetown, and such other ports as may hereafter be indicated by the Canadian Minister of Agriculture.

Animals imported *via* United States ports must be accompanied not only by the necessary health certificates from the country of origin, but also by a certificate of quarantine or inspection signed by a Veterinary Inspector of the United States Bureau of Animal Industry.

All animals imported from countries other than the United States, Newfoundland, and Mexico, must be accompanied by the certificate of a qualified veterinarian and of the local authority of the district whence they came to the effect that no serious infectious or contagious disease has existed in that district for a period of six months prior to their shipment.

Animals imported from the United States, Newfoundland, and Mexico, must be accompanied by a statutory declaration or affidavit made by the owner or importer stating the purpose for which the said animals are imported—viz., breeding, milk production, grazing, &c.

The importation of branded or range horses, mules and asses, other than those which are gentle and broken to harness or saddle, is prohibited.

A quarantine of 30 days shall be enforced upon cattle imported from the United Kingdom, counting from the date of arrival at the quarantine station, and a quarantine of 90 days, counting from the date of clearance of the vessel from the port from which the cattle were embarked, when imported from other countries (except the United States, Newfoundland, and Mexico).

In the case of sheep, goats, and swine, a quarantine of 30 days (counting from the date of clearance of the vessel from the port at which they were embarked) will be enforced, when imported from all countries, other than the United States, Newfoundland, and Mexico.

Prohibition of Landing of Hay and Straw from Sweden.—The Board of Agriculture and Fisheries have issued an order, dated 19th February, 1910, by which Sweden is added to the countries included in the Foreign Hay and Straw Order of 1908.

Revocation of Tuberculosis Order.—The Board of Agriculture and Fisheries made an Order, dated the 8th December, 1909, revoking the Tuberculosis Order of 1909 (*Journal*, June, 1909, p. 235).

Importation of Cattle into Ceylon.—The *Ceylon Government Gazette* of 31st December, 1909, contains a copy of an Ordinance (No. 25 of 1909) entitled "The Contagious Diseases (Animals) Ordinance, 1909," which repeals the "Cattle Disease Ordinance, 1891," and enumerates the diseases which will cause any animal or cattle suffering therefrom to be considered as diseased, and provides for the declaration of infected areas. Any vessel arriving with animals or cattle from a port or place declared by the Governor to be infected, may be placed in quarantine, and if any vessel arrives with diseased animals or cattle on board, such animals, &c., may be destroyed, with or without compensation, as the Governor may decide.

No person may import, or cause to be imported, into the Island any

animals or cattle from any port or place proclaimed to be a port or place in which disease is known to prevail.

Importation of Butter into Holland.—Butter or margarine imported into Holland is required, in accordance with a regulation of the 23rd December, 1909, to be accompanied by a certificate of origin showing the name, occupation, and address of the consignor and consignee, particulars of the package, and the name of the country where the butter or margarine was manufactured.

Importation of Plants into Dominica.—In accordance with Ordinance No. 9 of July 27th, 1904, all growing plants, cuttings, buds, and grafts, bulbs, roots and seeds, and also fruit and vegetables intended for propagation and not for consumption as food, must be landed at the Port of Roseau, or other ports designated by the Governor, and will be fumigated on arrival. A further Ordinance, No. 6 of April 12th, 1907, empowers the Governor to prohibit the introduction of plants or other articles which are likely to be a means of introducing any plant disease.

Importation of Plants into Barbados.—An order of May 13th, 1909, requires all plants, cuttings, &c., to be fumigated or disinfected, or if necessary destroyed, on arrival. The Superintendent of Agriculture may also require any plant to be grown apart in quarantine for twelve months.

Importation of Plants into Grenada.—An Ordinance dated June 1st, 1906, provides for the fumigation of plants on entry, and also gives power to prohibit introduction from any particular country.

Importation of Plants into Uganda.—A Decree (No. 2 of 1908) provides for the fumigation of plants on entry.

Importation of Live Stock into Austria.—An Austrian law, dated August 6th, 1909, has recently been published, dealing with the prevention and suppression of diseases of live stock and domestic animals. The import and transport of animals can only be effected by permission from the Ministry of Agriculture, and, in the case of animals coming from an infected country, may either be restricted or forbidden.

Importation of Canine Animals into Guernsey.—An Order-in-Council of the 2nd December, 1909, authorises restrictions on the importation into Guernsey of canine animals other than domestic dogs.

Importation of Animals into British Guiana.—The Governor is empowered by Ordinance No. 30 of 1909 at any time to prohibit the landing in British Guiana or prescribe the terms and conditions upon which the landing may be permitted, of animals, carcasses, fodder, litter, or dung.

Importation of Plants into Ceylon.—The introduction of plants is governed by Regulations of the 1st July, 1906, and 11th August, 1909, under the Insect Pest and Quarantine Ordinance No. 5 of 1901. All imported trees, plants, and parts thereof and a few fruit seeds, with the exception of potatoes, onions, and culinary vegetables imported for consumption, are subjected to treatment with hydrocyanic acid gas. A certificate of fumigation by some properly constituted authority at the port of shipment will be accepted as exempting fruit or plants from further treatment, but not a certificate of mere inspection.

Importation of Bees, etc., into the Transvaal.—The *Transvaal Government Gazette* of 31st December, 1909, contains regulations restricting the importation of bees, beeswax, honey, &c. The permission of the

Director of Agriculture must be obtained prior to the importation of any product of apiculture.

Importation of Plants into St. Lucia.—In accordance with the Plants Protection Ordinance, 1909, all plants and parts of them imported are subject to disinfection, and may be required to be grown in quarantine for twelve months. The Governor may by proclamation prohibit the importation of plants, earth, &c., likely to be the means of introducing plant diseases.

Importation of Plants into St. Christopher and Nevis.—Ordinance No. 3 of 1907 provides that all imported plants shall be fumigated on arrival.

Establishment of a Department of Agriculture at Manchester University.—In view of the increasing importance of the scientific aspects of the subject, the University of Manchester has decided to establish a course in Agriculture leading to a degree in Science.

The course will extend over three years, the first of which will as a rule be taken entirely at the University, while the second and third years will be taken partly at the University and partly at the College of Agriculture of the County Council of Cheshire at Holmes Chapel.

"French Gardening" Exhibition.—An exhibition of "French Gardening" is to be held at the Royal Botanic Society's Gardens at Regent's Park in July next. Actual "French" gardens will be shown in operation, and lectures will be given on the theory and practice of intensive cultivation, with exhibits of the straw mats, forcing frames, and "cloches" used in the system.

In the *first* week a changeable condition was prevalent over Great Britain. Rainfall was "moderate" everywhere, but was less frequent in the east than in the west and north. Temperature was below the average, especially in the eastern half of the country, but periods of clear sky were not uncommon in the southern districts, and bright sunshine was "abundant" in England N.W., S.W., S.E., and the Midlands; elsewhere it was "moderate."

During the *second* week rain fell almost every day over the greater part of the country, and the general character of the weather was very unsettled. Intervals of bright sunshine were, however, frequent in most parts of England, and the amount of rainfall is given as "moderate" everywhere. Warmth also was "moderate."

In the *third* week the general character of the weather was very rough and stormy, and over the greater part of the country rain fell every day, some of the falls being heavy in the west and north. Rainfall was "heavy" in all districts (in Scotland E. "very heavy"). Warmth was unusual in all districts of England, and moderate in Scotland, while sunshine varied in different parts.

The weather in the *fourth* week continued very unsettled, and was frequently rough and squally, with a violent gale at the beginning of the week. Both sunshine and warmth were "moderate" in almost all districts. Rainfall was "very heavy" in every district of England except N.E., where, as well as in Scotland, it was "heavy."

Notes on Crop Prospects Abroad.

The following information was published by the International Institute of Agriculture, Rome, in the *Bulletin of Agricultural Statistics* (No. 2) for February:—

CONDITION OF CROPS (100=average.)

Country.	Winter Wheat.		Winter Rye		Winter Barley
	Feb 1st, 1910	Jan 1st, 1910	Feb 1st, 1910	Jan 1st, 1910	Feb 1st, 1910
Belgium	95	100	98	100	100
Hungary	53 ¹	103	53 ¹	103	53 ¹
Canada	92	95	—	—	—
Denmark	95	98	98	98	90
Hungary	108	110	102	105	110
Luxemburg	224 ²	224 ²	191 ²	191 ²	172 ²
Roumania	105	—	105	—	100
Sweden	100	100	100	100	—
Switzerland	96	100	92	80	100
United States	103	—	—	—	102

¹ Scale 1 to 6. 6=very good; 4=average

² Scale 1 to 5. 1=very good, 3=average, 5=very bad

The information available as to the condition of these crops is as follows:—

Belgium.—In several parts of the country heavy rains have caused the autumn seedings to rot, and in other districts floods have prevailed. A part of the area seeded to autumn crops will have to be resown. The area of winter wheat sown is 358,000 acres, of winter rye 629,000 acres, and of winter barley 74,000 acres.

Bulgaria.—Late sown fields have a better aspect than early seedings.

Canada.—The Province of Ontario is sufficiently covered with snow. However, in the southern part of Alberta a small portion of winter wheat has suffered a reduction of 50 per cent, due to the absence of snow. The area of winter wheat is 794,700 acres, or 113 per cent. of the area harvested in 1909.

Denmark.—Probable deterioration due to snowfall.

France.—The area of winter wheat is 15,572,600 acres, or 96 per cent. of the area harvested in 1909; of winter rye 3,000,200 acres, or 97.6 per cent.; of meslin 338,600 acres, or 96 per cent.; of winter barley 1,989,000 acres, or 110.4 per cent.; and of winter oats 367,400 acres.

Hungary.—Continual rains have caused a deterioration which, with damage due to insect pests, amounts to about 2-3 per cent. for wheat, and 5-6 per cent. for rye.

Luxemburg.—The condition of the seedings is, in general, satisfactory. Late seedings have suffered from excess of moisture; early seedings, however, are in better condition. Sowing took place, almost everywhere, under most unfavourable conditions. The area sown is probably larger than for last year. Winter wheat especially has suffered from the rains, but reports for winter rye are more favourable. The report refers to January 15th, 1910.

Sweden.—Throughout the country the surface sown is under snow.

Switzerland.—Wheat was, without doubt, too highly estimated in January. In French Switzerland, especially, considerable damage has been caused by field and other mice. Late sowing has also delayed the development of the crops. Estimates for rye were, in January, too pessimistic; much more favourable reports have since come from French Switzerland. The area of winter wheat is now estimated at 119,000 acres, spelt 58,500 acres, in both cases the same as in 1909.

Tunis.—Autumn seedings by the natives, which took place in January, were favoured by rains throughout the whole of Tunis. The sowing of autumn crops by Europeans may be regarded as completed with the end of December. The area of winter wheat is 865,000 acres, of winter barley 889,000 acres, and of winter oats 96,000 acres.

Roumania.—The area of winter barley is 185,500 acres.

Hop Growing in Bavaria.—The British Vice-Consul at Nuremberg (Mr. S. Ehrenbacher) reports that, owing to the unsatisfactory condition of the hop industry in that country,¹ a meeting was held in February at Nuremberg at which the growing of sugar-beet in the place of hops was advocated. It was agreed that the hop soil is, as a rule, suitable for sugar-beet, and it was decided as a trial to put an extensive area under the crop this year. As soon as the owners of a certain acreage agreed to take up sugar-beet culture, a sugar factory would be started in the district, the necessary capital having already been guaranteed.

Argentina.—According to the *Review of the River Plate* for February 4th, the Argentine Department of Agriculture has issued the following revised estimate of the probable results of the present harvest, 1909-10:—Wheat, 3,825,000 tons; linseed, 800,500 tons; oats, 591,000 tons. These totals are expected to leave a surplus for export in 1910 of 2,400,000 tons of wheat and 700,000 tons of linseed. The area sown with maize in 1909-10 is returned as 7,422,000 acres. The British Consul at Buenos Aires, writing on February 2nd, stated that the prospects of the maize harvest were said to be excellent, having been much improved by rains in December and January.

The Board of Agriculture and Fisheries have been furnished by the Board of Trade with the following report, based on returns from correspondents in various districts, on the demand for agricultural labour in February.

**Agricultural Labour
in England
during February.**

Agricultural employment was much affected by wet weather in February, work on the land being impracticable in many cases. Threshing, hedging, ditching, manure carting, &c., provided work for day labourers when the weather permitted, but men of this class lost a good deal of time on account of rain, and the supply was generally somewhat in excess of requirements.

Northern Counties.—Agricultural employment in *Northumberland* was somewhat affected by wet and stormy weather, but was fairly

¹ *Journal*, April, 1909, p. 36, and August, 1909, p. 390.

regular on the whole. A few day labourers found occasional employment at hedging and ditching. Bad weather caused a good deal of interruption to outdoor work in *Cumberland*, *Westmorland* and *Lancashire*, and the demand for day labourers in these counties was correspondingly affected. There was only a limited demand for day labourers in *Yorkshire* (for such work as threshing, hedging, ditching and manure carting), and there were generally more of this class seeking work than were wanted. Some excess in the supply of men for permanent situations was also reported in several districts, a correspondent in the Bridlington Union remarking that young men were more numerous than for some years.

Midland Counties.—Employment was fairly regular in *Cheshire* and *Derbyshire*, though a few day labourers lost time on account of bad weather. Threshing, hedging, &c., provided a fair amount of work for day labourers in *Nottinghamshire*, where the supply of and demand for this class of men were generally about equal. Wet weather greatly hindered outdoor work in *Leicestershire*, and there was loss of time among day labourers in consequence. Day labourers were also in irregular employment in *Staffordshire*, the supply of men being generally in excess of requirements. Bad weather hindered farm work somewhat considerably in *Shropshire* and *Worcestershire*, and some day labourers in these counties lost a good deal of time. Employment was also irregular in *Warwickshire*, where day labourers employed at threshing and other work were affected by the bad weather. The weather similarly interrupted work in *Northamptonshire*, where there was a fairly good demand for day labourers when the weather permitted. A limited demand for day labourers was reported from *Oxfordshire* and *Buckinghamshire*, and in several districts the supply was in excess of requirements. Men of this class were generally in irregular work in *Hertfordshire* and *Bedfordshire*, on account of wet and stormy weather. A report from North Bedfordshire mentions a demand for shepherds and men for tending cattle.

Eastern Counties.—Employment was fairly regular in *Huntingdonshire*, though hindered somewhat by wet weather, in the case of day labourers. Men of this class were not in much demand in *Cambridgeshire* on account of bad weather. There was a fairly good demand for day labourers, on the whole, in *Lincolnshire*. At the Candlemas hirings in this county wages showed little change compared with a year ago. Bad weather caused a certain amount of interruption to the employment of day labourers in *Norfolk* and *Suffolk*, but threshing, hedging, ditching and manure carting generally provided a good deal of work, and but little excess in the supply of labourers was reported. There was only a moderate demand for day labourers in *Essex*.

Southern and South-Western Counties.—Outdoor farm work was much hindered by rain in *Kent*, and the demand for day labourers is reported to have been smaller than is usual in February. Hedging, ditching, root-cleaning, &c., provided a moderate amount of work for day labourers in *Surrey* and *Sussex*, but in these counties also there was much unemployment among this class of men, on account of wet weather, which rendered work on the land impracticable in many districts. There was generally only a moderate demand for day

labourers in *Hampshire* and *Berkshire*. Wet weather caused loss of time to men employed at threshing and other work in *Wiltshire*, and more men than usual were reported in irregular work. Day labourers were generally in little demand in *Dorset*; there was a surplus of men seeking permanent situations at the Dorchester hiring fair, a correspondent reporting the supply as larger than for some years. Not much irregularity of employment was reported in *Somerset*, where, however, rain caused a certain amount of lost time to day labourers. In *Herefordshire*, on account of an unusually wet month, day labourers were in small request. A correspondent in the Bromyard Union states that there was a demand for cowmen and waggoners. The weather also affected employment in *Gloucestershire*, and several day labourers were in irregular work. In *Devon* and *Cornwall* there was generally plenty of work for day labourers when the weather permitted, but in most districts a few days were lost through rain.*

THE CORN MARKETS IN FEBRUARY.

C. KAINS-JACKSON.

The course of the markets since the close of January has been discouraging alike to sellers and buyers; to sellers because the prices obtainable have not been so good as formerly, to buyers because their willingness to pay full prices for good quality has failed to elicit a sufficient choice of samples reaching a good standard.

Wheat.—The price of British wheat in London has been reduced by about a shilling per qr., the decline in the country districts being a little less, though at several of the country markets, especially in the north, wheat above chicken or feeding quality appears scarcely to have been offered. The sales in London, though not so good as in January, have been fair and had the level of quality been a little higher would probably have been satisfactory. Few lots of fair type and good weight lacked buyers, and seed wheat of sorts fit for spring sowing reached really high prices, 48s. to 64s. per qr. Business in these is mostly done off the market. The price of good white wheat for milling use as the month closed was 39s. per 504 lb., while the bulk of samples offering ranged from 33s. to 36s. per qr. Bad condition rather than light weight led to these disappointing quotations.

Foreign wheat has declined a shilling for Manitoba, which has been in increased supply. Little has been done in Australian or Argentine pending new arrivals and the Indian 1909 wheat is scarce and dear. An increased supply is to hand from Russia, and is offered at 40s. per qr. Argentine new crop had been steady for prompt shipment at 38s. to 38s. 6d. per qr. till the 25th, when 37s. 6d. to 37s. 9d. was accepted, a fall which caused a depressed feeling at Mark Lane at the close of the month.

On that date 3,300,000 qrs. of foreign wheat were on passage, against 2,500,000 qrs. on February 1, 1910, but 3,500,000 qrs. on February 28, 1909. Compared with a year ago, expectations of Russian and

Australian wheat are much increased, but they are greatly reduced as regards Argentine wheat. America promises us equal quantities to those of March last. February shipments were 685,000 qrs. from North America, 1,328,000 from South America, 1,780,000 from Russia, 148,000 from "Europe S.E.," 117,000 from India, and 943,000 from Australia. The Russian shipments are unusually large for a winter month.

Flour.—Owing to the scarcity of Hungarian the top-price London flour millers are still able to obtain 35s., though Household flour declined another 6d., and on February 28 was 1s. cheaper from New Year's Day. Excessive supplies of country flour into London have depressed a market, which, with open weather and a good winter supply of green vegetables, was already suffering from a small retail consumption of bread. Happily for the trade, receipts from America have been quite moderate. American shipments were only 391,000 sacks, and the supply on passage on the 28th was down to 174,000 sacks.

Barley.—Not for several years has barley been so depressed a trade as during the past month, buyers failing to find good quality either in British or imported kinds and demand being reduced to that for cheap grinding purposes. Averages like 22s. 4d. at Mark Lane, 22s. 8d. at Reading, and 23s. 9d. at Ipswich, are in a way even more significant than somewhat lower rates in districts where feeding barley usually predominates. Brewing barley has made 28s. to 29s. per 448 lb. in Norfolk for local growth, and 33s. to 34s. in London for Californian, while here and there a fine malting sample has been secured at 36s. to 39s. per qr. The mean price of British barley is about 3s. lower on the year. Russian has declined from 20s. 9d. to 20s. 3d. per 400 lb.

The month's shipments were 98,000 qrs. from California, 805,000 qrs. from Russia, and 107,000 qrs. from "Europe S.E." The supply on passage, 480,000 qrs., is not heavy; it is the predominance of inferior quality both home-grown and imported which depresses the market.

Oats.—The average price of this staple is about what it was a year ago both for British and foreign, but Argentina's new crop is offered for March shipment at 14s. 3d. per 304 lb., and Russia is expected, with the full resumption of Baltic navigation in later April, to offer large supplies of oats grown in the northern provinces. The Bulletin of the International Agricultural Inst. (Rome, February 20th) credited Russia with nearly sixty million cwt. more oats than at this time last year, and London traders anticipate a very fierce spring competition between Argentina and Russia for English custom. Russia has the more seasoned grain and the lower freight, but meanwhile Argentina is doing a large forward trade.

Shipments in February were 478,000 qrs. from South America and 791,000 qrs. from Russia and the total on passage on the 28th was very high—700,000 qrs. A striking circumstance is that heavy oats are quite rare, especially the foreign kinds, and London during February bought somewhat freely of Scotch growers.

Maize.—Mark Lane prices as the month closed were not low for a date when this cereal is frequently at its year's lowest value. One may mention 26s. 6d. to 27s. for new crop American, 27s. 3d. to 27s. 9d. for Natal, 26s. to 27s. for West African, 27s. 9d. to 28s. for Argentine yellow, and 26s. 6d. to 26s. 9d. for Indian. New Russian maize freshly

to hand from Odessa was fetching 28s. off stands; old maize commanded a shilling less than this. Imports for February did not exceed requirements. For the first half of the cereal year they were about 4,690,000 qrs. and as needs are currently put at ten million qrs. annually, the situation is fairly strong for holders.

Shipments in February were 598,000 qrs. from North America, 125,000 from South America, 124,000 from Russia, and 196,000 from "Europe S.E.," which in the maize trade is a very appreciable factor. The supply on passage has further declined to 400,000 qrs.

Oilseeds.—Linseed on spot has averaged about 16s. per cwt., but for March shipment from Argentina 57s. per 416 lb. (15s. 4d. per cwt.) has been accepted. Even 15s. per cwt., however, is a high price, and the supply of linseed cake for the remainder of the year is matter for much discussion. The shipments of linseed for February were 779,000 qrs. from Argentina and 12,000 qrs. from India. The world's shipments from January 1 to February 28, 1910, were about 1,400,000 qrs., against 1,820,000 qrs. from January 1 to February 28, 1909. This 420,000 qrs. comparative deficiency is serious.

Oilcake.—Good linseed cake at Canterbury on the 26th made 10s. per cwt. London on the 28th was cheaper than this; 9s. 3d. being about the value *ex mill*. London trade, however, is of a large wholesale description; ten tons would be a small purchase. A single cwt. in the suburbs costs 10s. and over, even for cash, but the seller delivers it. Soy bean cakes at the end of February made £6 17s. 6d. per ton *ex mill*, cottonseed cakes 6s. 3d. per cwt. *ex mill*.

Various Feeding Stuffs.—Beet sugar increases steadily in feeding use. This cheap sugar has risen from 12s. 6d. per cwt. on January 1, to 14s. on February 28. Rice for feeding purposes is also in request and with sugar constitutes the one side of the market which has displayed animation. Feeding rice opened on January 1 at 6s. 9d. per cwt. and closed on February 28 at 7s. 2d. Bran, sharps, and middlings have not changed in price of late; the trade has been fair. Whole meal holds its own rather better than the so-called "superior article" flour. About 29s. per 280 lb. sack is quoted to cash buyers. Rye and Dari each at 27s. per 480 lb. are feeding stuffs which appear to represent specially good value, and Indian chick peas (*gram*) at 27s. 6d. per 504 lb. should prove highly profitable in mixed rations. Buyers who demand pulse in a split form have been paying 11s. per cental for lentils, 10s. 9d. per 160 lb. bag for beans, 10s. per cental for good peas.

THE LIVE AND DEAD MEAT TRADE IN FEBRUARY.

A. T. MATTHEWS.

Fat Cattle.—The trade of the month may be generally characterised as steady, with a good demand and small fluctuations in value. There have been fair average supplies, and few complaints have been heard of lack of quality or condition. Shorthorns started at an average in English markets of 8s. 4½d. per 14 lb. stone for first, and 7s. 8½d. for second quality, but a fall of 1½d. per stone on the former had taken place by the 10th. Another decline of ½d. followed by the 17th, which was recovered in the last week, when the average in twenty-four

English markets stood at 8s. 2½d. for first, and 7s. 6½d. for second quality. Perhaps the most erratic market was the Metropolitan at Islington, which is always very sensitive to influences not very tangible. For instance, there was a bad market on the 7th, for which there was no apparent cause, except the damp and warm weather. The best Shorthorns, which a week before would have realised 9s. per stone, dropped suddenly to 8s. 2d., a fall of ½d. per lb. in a week, but nothing of this sort occurred in any of the country markets. Other breeds showed much smaller variations throughout, Devons remaining especially steady at an average of about 8s. 5d. A very few choice Aberdeen Angus appeared each week at Islington, and realised high prices, varying from 8s. 9d. to 9s. 4d. per stone. Trade in Scotland was rather slow in the last week, and 40s. per live cwt. even for the best Black Polls was scarcely exceeded.

Veal Calves.—There was an increased demand for fat calves, which is usually the case at the approach of spring, and, although there were more on offer, prices were firm, the weekly averages varying but little. These have been from 8½d. to 8¼d. per lb. for first, and 7½d. to 7¼d. for second quality. Derby and Preston were, as usual, amongst the best markets for calves, while London, owing to the good supplies of prime small Dutch carcasses at Smithfield, was among the cheapest.

Fat Sheep.—Contrary to the expectations of many persons engaged in the trade, there has been a very solid appreciation in the values of sheep, and prices at the end of the month nearly approached those prevailing two years ago. The net advance on best small Down tegs during the month was fully ¼d. per lb., and the average of twenty English markets in the last week was only a very small fraction under 8¼d. per lb. No less than eleven leading markets of the week ending February 24th showed higher quotations for Downs, and twenty-seven were reported as generally better, with only one lower. The fact that Longwools averaged within ¼d. per lb. of the price of the prime Downs was indicative of the keen demand now existing for mutton. Though the rise has been general over the country, there was a remarkable difference in its extent at the various centres. Taking the list of prices for Downs in the last week, we find that at Salford they were quoted as high as 10d. per lb. for first, and 9d. for second quality, while at Hereford and Wellington the highest price was 8½d., and even at London was only 8¼d. A margin of 1½d. per lb. between markets at no great difference apart is almost startling, as it represents no less than 9s. to 10s. per head. Cheviots and Crossbreds also touched 10d. per lb. at Preston and Salford.

Fat Pigs.—There was no weakening in the trade for fat pigs, taking the whole month, although a slight check occurred in the week ending on the 10th. This was fully recovered, and values finished at the highest point for bacon pigs. In 31 markets of England and Scotland the average was a little over 7s. 9½d. per stone for first, and 7s. 3d. for second quality.

Carcase Beef—British.—Scotch beef, especially short sides, has been a very quiet trade at prices somewhat below those of January. These began at 7d. per lb., and declined to 6½d., while long sides gave way a similar amount, and during the last two weeks their value in London was 6½d. for first, and 6d. for second quality. Some Norfolk beef of

fair quality was on offer at Smithfield, and realised from 5½d. to 6d. per lb.

Port Killed Beef.—The quality of the American beef killed at ports of landing was more even, and sold at 6d. to 6½d. early in the month, but declined to 5½d.–5¾d. before the close.

Chilled Beef.—There was a moderate and rather steady trade in chilled beef throughout, both from Argentina and the States. The latter is invariably higher in value than the former, and hindquarters fluctuated between 5½d. to 6½d. in the first week, and 5½d. to 6½d. at the close of the month. The best Argentine hindquarters sold at 4½d. to 4¾d. per lb., and forequarters at about 3½d.

Frozen Beef.—A quiet and very featureless trade prevailed in frozen beef. Best hindquarters sold at 3½d. per lb., and forequarters at 2½d. to 3½d. per lb. In the last week there was little difference between fore and hindquarters in value.

Carcase Mutton—Fresh Killed.—Scotch mutton at the beginning of the month was fetching 7d. per lb., but advanced to 7½d. at the end. English tegs realised from 6½d. to 7d. Some prime Down lamb from Wallingford arrived on the 23rd, and realised 1s. 1d. per lb.

Frozen Mutton.—The best New Zealand mutton has been selling at 4½d., and Argentine at 3½d., per lb. New season lamb from New Zealand was rather dear, and touched 6d. per lb. in the Central Market.

Veal.—This article was in fair demand at 7½d. to 8½d. per lb. in London, but dearer in Liverpool and Manchester.

Pork.—A very steady trade in London for the first fortnight at 7½d. per lb. for medium small English, dropping ½d. about the 16th, but recovering the following week. Dutch was worth about ½d. per lb. less money.

THE PROVISION TRADE IN FEBRUARY.

HEDLEY STEVENS.

Bacon.—February is generally considered to be one of the quietest months in the bacon and ham trade, and this year, on account of the abnormal conditions prevailing in the trade, it has been unusually slack throughout. The consumptive demand shows still further reduction, as the general public cannot afford to pay the prevailing high prices, while the retail dealers do not push the business, as it is unprofitable to them. In spite of these facts, however, prices for most cuts show advances on the month.

The difficulty in obtaining supplies continues; the arrivals from Denmark are still very small, and all advices point to further reductions in the arrivals from that country right through the summer. In America the advance in the price of hogs has been phenomenal, top prices having reached \$9.70, and in consequence the contracting business with England for shipments during the spring is practically at a standstill. During February last year light average American clear bellies were selling for shipment at about 52s. per cwt.; this year 74s. is demanded. The weekly arrivals from America have been unusually small, and as cable advices report the general opinion to be that the present high range of prices must continue throughout the summer, it means that the arrivals from the United States will

be still further curtailed, our home-cured and Danish bacon being proportionately cheaper.

Arrivals of Canadian bacon show further decreases, the packers having reduced their killings on account of the losses made by their agents in England in selling on our markets.

The scarcity of pigs in England continues to harass curers, and high prices are being paid. In some districts conferences between merchants and farmers are being arranged with a view to stimulate the breeding of pigs in this country, and so relieving the situation.

Butter.—As anticipated in the January review, the high prices have not been maintained, and by the third week of February the drop from top prices was 7s. to 8s. per cwt. By the end of the month, however, prices had again advanced several shillings. The advances have each time checked the demand, and in the opinion of most operators the market will not be sustained at these extreme values.

Secondary butter continues scarce, and in consequence there is a largely increased demand for margarine. Cable advices from both Australia and New Zealand report favourable weather conditions, so the large make continues. Advices from Canada report much firmer markets, with some orders from Vancouver on the Montreal market, brought about by the advance in England having diverted some shipments from Australia and New Zealand intended for that market; also some dairy butter has been shipped over here at around 95s. c.i.f., which was originally intended for home consumption.

Prices remain abnormally high in America, fancy fresh realising equal to 153s. c.i.f. per cwt., and stored lots sell at around 146s. c.i.f. These prices are a little easier than those current in January.

Cheese.—The demand has been disappointingly quiet throughout the month, and prices show little change. The shipments and arrivals from New Zealand continue large—in fact, about 50 per cent. in excess of last year—which has doubtless prevented the advance desired for Canadian makes, in order to enable importers to dispose of their holdings at a profit.

The shipments from Canada during the month have been in excess of last year, and from May 1st, 1909, to February 17th, 1910, the figures are 2,056,680 cheese, against 1,994,845 for the previous corresponding period, or an increase of 61,835 cheese. Stocks on hand in Canada are reported to be much below the average, and best lots are held for 62s.-63s. In America prices remain about unchanged—say about 83s. per cwt. as top.

At the end of the month the estimated stocks of Canadian cheese at the three principal distributing centres (London, Liverpool, and Bristol) were 221,000 boxes, against 194,000 boxes last year, and 185,000 boxes two years ago.

There has been a steady trade in English cheese, stocks on hand being about the average for the time of year. The demand has been mostly for fancy goods and the lower grades, the latter being wanted through the few summer-made Canadians available.

Eggs.—On account of the mild weather throughout the month, prices have on the whole favoured buyers. New laid have been marketed more freely, and prices have eased. The market in Canada continues very firm, new laid bringing 33 cents easily.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES OF LIVE STOCK in ENGLAND and SCOTLAND
in the Month of February, 1910.

(Compiled from Reports received from the Board's Market
Reporters.)

Description.	ENGLAND.		SCOTLAND.	
	First Quality.	Second Quality.	First Quality.	Second Quality.
FAT STOCK:—	per stone.*	per stone.*	per cwt.†	per cwt.†
Cattle:—	s. d.	s. d.	s. d.	s. d.
Polled Scots	8 5	8 0	40 0	36 6
Herefords	8 4	7 10	—	—
Shorthorns	8 3	7 7	38 11	35 11
Devons	8 5	7 10	—	—
	per lb.*	per lb.*	per lb.*	per lb.*
	d.	d.	d.	d.
Veal Calves	8½	7½	9	7
Sheep:—				
Downs	8½	7½	—	—
Longwools	8	7½	—	—
Cheviots	9	8	8½	7½
Blackfaced	8½	7½	7½	6½
Cross-breds	8½	7½	8½	7½
	per stone.*	per stone.*	per stone.*	per stone.*
	s. d.	s. d.	s. d.	s. d.
Pigs:—				
Bacon Pigs	7 9	7 3	7 9	6 10
Porkers	8 4	7 9	8 3	7 3
LEAN STOCK:—	per head.	per head.	per head.	per head.
Milking Cows:—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk ..	22 5	18 5	22 7	18 6
„ —Calvers	21 16	17 17	19 10	17 2
Other Breeds—In Milk ..	22 7	14 16	19 8	16 9
„ —Calvers	—	—	19 10	16 11
Calves for Rearing	2 5	1 15	2 15	2 1
Store Cattle:—				
Shorthorns—Yearlings ..	10 3	8 12	9 11	8 1
„ —Two-year-olds ..	13 15	12 1	15 4	12 1
„ —Three-year-olds ..	16 7	14 3	17 9	14 15
Polled Scots—Two-year-olds	—	—	16 17	14 6
Herefords—	15 8	13 12	—	—
Devons—	14 0	11 8	—	—
Store Sheep:—				
Hoggs, Hoggets, Teds, and Lambs—	s. d.	s. d.	s. d.	s. d.
Downs or Longwools ..	41 3	34 0	—	—
Scotch Cross-breds	—	—	28 6	23 3
Store Pigs:—				
Under 4 months	28 7	22 0	24 3	18 9

* Estimated carcase weight.

† Live weight.

**AVERAGE PRICES of DEAD MEAT at certain MARKETS in
ENGLAND and SCOTLAND in the Month of February, 1910.**

(Compiled from Reports received from the Board's Market Reporters.)

Description	Quality.	London.	Birming- ham.	Man- chester.	Liver- pool.	Glas- gow.	Edin- burgh.
		per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
BEEF :—							
English	1st	56 0	54 6	52 6	53 6	59 0*	53 6*
	2nd	53 6	50 6	50 0	49 0	51 6*	49 6*
Cow and Bull	1st	43 0	48 0	46 6	43 6	47 0	44 6
	2nd	37 6	43 0	42 0	38 0	38 6	37 6
U.S.A. and Cana- dian —							
Port Killed	1st	56 0	51 6	51 6	54 0	53 6	—
	2nd	53 0	46 6	50 6	49 6	51 6	—
Argentine Frozen—							
Hind Quarters	1st	30 6	32 6	32 0	32 0	31 0	32 0
Fore "	1st	27 6	29 6	28 6	28 6	28 0	28 6
Argentine Chilled—							
Hind Quarters	1st	43 0	43 6	42 0	41 6	41 6	41 6
Fore "	1st	31 0	32 6	32 0	32 0	32 0	31 0
American Chilled—							
Hind Quarters—	1st	59 6	57 0	57 6	57 6	56 0	59 0
Fore "	1st	38 6	38 0	39 0	39 0	37 6	40 0
VEAL :—							
British	1st	74 6	67 6	77 0	79 6	—	—
	2nd	70 0	57 0	70 0	70 0	—	—
Foreign	1st	73 0	—	65 6	70 0	—	73 6
MUTTON :—							
Scotch	1st	66 6	64 0	73 0	72 6	64 6	61 0
	2nd	62 0	60 6	67 6	67 6	54 0	51 6
English	1st	62 0	60 6	69 6	67 0	—	—
	2nd	58 6	52 6	64 6	63 0	—	—
Argentine Frozen	1st	35 6	33 6	33 0	33 0	32 0	33 6
Austra'ian "	1st	31 6	31 0	31 0	31 6	32 6	31 0
New Zealand "	1st	38 0	—	—	—	—	—
LAMB :—							
British	1st	101 6	102 6	—	—	—	—
	2nd	93 6	93 6	—	—	—	—
New Zealand	1st	50 0	50 0	51 6	51 6	46 6	—
Australian ...	1st	42 0	41 0	38 0	38 0	39 0	35 0
Argentine ...	1st	41 6	40 0	38 6	38 6	38 0	37 6
PORK :—							
British ...	1st	67 0	70 0	72 6	72 6	65 6	67 0
	2nd	60 6	62 6	67 0	66 0	62 6	59 0
Foreign ...	1st	64 6	—	—	—	—	—

Scotch.

AVERAGE PRICES of British Corn per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1908, 1909 and 1910.

Weeks ended (in 1910)	WHEAT.						BARLEY.						OATS.					
	1908.		1909.		1910.		1908.		1909.		1910.		1908.		1909.		1910.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Jan. 1	35	1	32	0	33	3	26	9	26	7	25	1	18	4	17	4	17	4
" 8	35	2	32	9	33	6	26	9	26	11	24	11	18	3	17	5	17	2
" 15	35	5	32	8	33	8	27	1	27	1	24	11	18	5	17	5	17	7
" 22	35	6	33	2	33	9	26	11	27	3	24	11	18	5	17	8	17	6
" 29	35	0	33	0	33	6	26	11	27	6	25	0	18	4	17	9	17	4
Feb 5	34	3	33	4	33	7	26	9	27	7	24	10	18	3	17	10	17	7
" 12	33	1	33	8	33	4	26	9	27	8	24	9	18	0	17	11	17	11
" 19	32	6	34	1	33	0	26	5	27	11	24	6	17	11	18	0	18	0
" 26	30	11	34	5	32	7	26	3	28	0	24	2	17	8	18	0	17	10
Mar. 5	30	5	34	10	32	7	26	1	27	11	24	6	17	8	18	2	18	1
" 12	31	3	35	8			26	0	28	4			17	10	18	2		
" 19	31	7	35	9			26	2	28	0			17	11	18	5		
" 26	31	4	36	0			25	10	28	0			17	10	18	6		
Apl. 2	31	3	36	5			25	5	27	10			17	9	18	8		
" 9	31	2	37	4			25	10	28	0			17	7	18	10		
" 16	30	11	38	7			26	1	27	8			17	7	19	2		
" 23	30	10	41	4			25	5	28	2			17	9	19	9		
" 30	31	6	42	5			25	8	27	10			18	0	20	0		
May 7	32	4	40	9			25	5	27	7			18	4	20	3		
" 14	33	1	41	6			24	9	27	3			18	7	20	6		
" 21	33	8	42	8			25	9	27	0			18	10	20	11		
" 28	33	5	42	6			24	6	26	3			18	8	21	0		
June 4	33	1	43	1			25	10	25	7			18	4	21	3		
" 11	32	7	42	11			24	5	26	10			18	4	21	4		
" 18	32	0	42	7			24	2	26	10			18	5	21	6		
" 25	31	5	42	8			24	0	27	2			18	7	21	7		
July 2	30	11	42	9			23	11	27	2			18	7	21	9		
" 9	30	5	43	0			24	4	26	4			18	5	21	8		
" 16	30	7	43	3			23	1	26	10			18	5	21	9		
" 23	31	5	44	0			26	5	27	4			18	6	22	5		
" 30	31	10	43	5			24	4	24	6			18	7	22	2		
Aug 6	31	6	44	9			23	1	27	4			18	9	22	11		
" 13	31	6	44	9			23	10	24	9			18	1	21	8		
" 20	31	2	41	6			24	5	23	11			17	10	19	8		
" 27	30	10	38	5			24	5	24	7			17	1	19	4		
Sept. 3	30	10	37	2			25	5	26	3			17	3	19	6		
" 10	31	5	34	11			25	11	26	1			17	6	18	5		
" 17	31	7	33	6			26	0	26	5			17	3	17	9		
" 24	31	5	32	9			26	8	26	8			17	2	17	7		
Oct 1	31	7	32	2			26	11	26	9			17	2	17	2		
" 8	31	5	31	8			27	5	26	9			17	0	17	0		
" 15	31	2	31	4			27	6	27	0			17	0	17	0		
" 22	30	11	31	8			27	5	27	7			16	11	16	11		
" 29	30	8	31	10			27	5	27	9			16	11	17	0		
Nov. 5	30	11	32	5			27	6	27	9			17	0	17	0		
" 12	31	2	32	5			27	4	27	7			17	0	17	1		
" 19	31	10	32	7			27	3	27	0			17	3	17	4		
" 26	32	3	33	0			27	2	26	8			17	5	17	3		
Dec. 3	32	7	33	3			27	2	26	1			17	4	17	4		
" 10	32	8	33	3			27	0	25	7			17	4	17	3		
" 17	32	9	33	2			26	9	25	3			17	3	17	4		
" 24	32	2	33	1			26	8	25	2			17	2	17	4		

Imperial Bushels at the following rates: Wheat, 60 lbs.; Barley, 50 lbs.; Oats, 39 lbs. per Imperial Bushel.

AVERAGE PRICES of Wheat, Barley, and Oats per Imperial Quarter in FRANCE, BELGIUM, and GERMANY, and at PARIS, BERLIN, and Breslau.

	WHEAT.		BARLEY.		OATS.	
	1908.	1909.	1908.	1909.	1908.	1909.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Belgium : December	32 4	35 7	25 7	23 7	19 7	19 5
Germany : December	42 3	43 10	30 1	26 7	21 9	20 9
Berlin : December	44 8	47 8	—	—	22 7	21 7
Breslau : December	40 5	44 6	30 8 (brewing)	26 10 (brewing)	20 8	19 10
			26 9 (other)	25 1 (other)		
	1909.	1910.	1909.	1910.	1909.	1910.
France : January	38 0	40 2	25 10	25 8	20 1	21 0
February	38 8	41 0	26 2	25 11	20 4	21 6
Paris : January	39 3	42 0	23 3	24 8	20 5	20 8
February	39 8	42 7	23 3	24 8	20 11	21 7
Germany : January	42 8	44 8	29 9	26 5	21 11	21 2
Berlin : January	44 11	48 8	—	—	23 3	22 11
Breslau : January	40 5	45 10	30 8 (brewing)	26 2 (brewing)	20 8	20 4
			26 2 (other)	24 6 (other)		

NOTE.—The prices of grain in France have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*; the Belgian quotations are the official monthly averages published in the *Moniteur Belge*; the German quotations are taken from the *Deutscher Reichsanzeiger*, the prices for the German Empire representing the average of the prices at a number of markets.

AVERAGE PRICES of British Wheat, Barley, and Oats at certain Markets during the Month of February, 1909 and 1910.

	WHEAT.		BARLEY.		OATS.	
	1909.	1910.	1909.	1910.	1909.	1910.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
London... ..	35 0	33 8	26 3	23 7	18 11	18 11
Norwich	33 3	32 11	27 1	23 8	17 9	17 6
Peterborough ..	33 4	32 1	26 7	23	17 7	17 1
Lincoln... ..	33 8	32 6	28 6	25 2	17 10	17 10
Doncaster	33 7	32 7	29 2	25 1	17 9	17 6
Salisbury	34 4	33 4	28 7	25 0	17 6	18 1

**AVERAGE PRICES of PROVISIONS, POTATOES, and HAY at certain
MARKETS in ENGLAND and SCOTLAND in the Month of
February, 1910.**

(Compiled from Reports received from the Board's Market Reporters.)

Description.	London.		Bristol.		Liverpool.		Glasgow.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
BUTTER :—	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British	16 6	14 9	15 0	14 3	—	—	16 0	—
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery	—	—	—	—	—	—	—	—
" Factory	—	—	114 0	—	—	—	—	—
Danish ..	128 6	125 6	—	—	128 0	125 6	127 6	—
Russian	117 0	114 0	—	—	—	—	115 6	110 0
Australian	119 0	117 0	120 0	116 6	119 6	117 6	121 0	117 0
New Zealand	120 0	118 0	122 6	119 0	121 0	119 6	123 0	—
Argentine	124 0	121 0	120 6	119 6	120 0	118 0	122 0	—
CHEESE :—								
British—								
Cheddar	80 0	69 6	74 0	61 6	74 0	72 0	66 6	59 0
	120 lb.	120 lb.	—	—	120 lb.	120 lb.	—	—
Cheshire	86 0	68 6	—	—	82 0	72 0	—	—
	per cwt.	per cwt.			per cwt.	per cwt.		
Canadian	61 6	59 6	61 6	59 6	61 6	58 6	61 0	58 6
BACON :—								
Irish ...	72 0	70 0	74 0	70 0	72 0	70 0	76 0	73 6
Canadian ..	67 6	—	68 6	65 6	66 6	64 0	68 0	66 0
HAMS :—								
Cumberland	105 6	96 0	—	—	—	—	—	—
Irish ...	100 0	92 6	—	—	—	—	92 0	80 6
American (long cut) ..	66 0	—	67 0	64 0	67 6	64 0	66 6	64 6
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British ..	13 1	12 3	12 6	—	—	—	—	—
Irish	12 0	10 6	10 11	10 1	11 4	10 9	11 3	10 6
Danish ..	12 4	10 0	—	—	10 9	—	11 4	9 11
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Langworthy ..	80 0	70 0	75 0	65 0	81 6	76 6	70 0	65 0
Scottish								
Triumph	73 6	62 6	70 0	60 0	55 0	50 0	—	—
Up to Date ..	73 6	62 6	75 0	65 0	55 0	50 0	63 6	58 6
HAY :—								
Clover ...	103 0	78 0	90 0	75 0	102 6	72 6	80 6	77 6
Meadow ...	94 6	72 0	75 0	60 0	—	—	80 0	77 0

DISEASES OF ANIMALS ACTS, 1894 to 1909.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

DISEASE.	FEBRUARY.		TWO MONTHS ENDED FEBRUARY.	
	1910.	1909.	1910.	1909.
Swine-Fever :—				
Outbreaks	101	105	203	263
Swine Slaughtered as diseased or exposed to infection ...	849	1,017	1,539	2,060
Anthrax :—				
Outbreaks	121	113	276	252
Animals attacked	149	165	333	340
Foot-and-Mouth Disease :—				
Outbreaks	—	—	—	—
Animals attacked	—	—	—	—
Glanders (including Farcy) :—				
Outbreaks	30	51	64	96
Animals attacked	93	164	190	260
Sheep-Scab :—				
Outbreaks	83	122	243	312

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

DISEASE.	FEBRUARY.		TWO MONTHS ENDED FEBRUARY.	
	1910.	1909.	1910.	1909.
Swine-Fever :—				
Outbreaks	1	2	6	5
Swine Slaughtered as diseased or exposed to infection ...	60	1	214	13
Anthrax :—				
Outbreaks	2	—	4	1
Animals attacked	4	—	6	1
Sheep-Scab :				
Outbreaks	74	80	190	165

SELECTED CONTENTS OF PERIODICALS.

Agriculture, General and Miscellaneous—

Bodenimpfversuche mit "Nitragin" und "Nitrobacterine," *E. Grabner*. (Jour. Landw., Vol. 57, No. 3.)

The Agricultural Development of Nyasaland, *S. Simpson*. (Jour. Roy. Soc. Arts, 17 Dec., 1909.)

L'Agriculture Suédoise au commencement du XX^e Siècle, *Émile Levasseur*. (Rev. Écon. internat., 7 Year, Vol. I., No. I.)

Factors which determine Fertility in Soils, *E. J. Russell*. (Sci. Prog., Jan., 1910.)

Horticulture—

Elektrokultur, *H. Nehbel*. (Fühlings' Landw. Ztg., 1 Dec., 1909.)

The Nova Scotia Apple Industry. (Jour. Roy. Soc. Arts, 11 Feb., 1910.)

Plant Diseases—

Potato "Wart" Disease: the Life-history and Cytology of *Synchytrium endobioticum* (Schilb.), *Percl., John Percival*. (Centbl. Bakt. [etc.], Vol. 25, No. 14-18.)

Krankheiten der Selleries, *H. Klebahn*. Über die chemische Zusammensetzung von Coopers-Fluid und einige Versuche zur Bekämpfung der Blutlaus, *E. Schaffnit*. (Ztschr. Pflanzenkrank., Vol. XX., No. 1.)

Habrobracon hebetor Say. Ein Bundesgenosse im Kampf gegen die Mehlmotte, *J. Buchwald* and *E. Berliner*. (Ztschr. Gesam. Getreidew., Vol. 2, No. 1.)

Über das Auftreten des durch *Urophlyctis Alfalfae*, *P. Magn.*, hervorgerufenen Wurzelkrebses der Luzerne in Bayern, *G. Korff*. (Prakt. Bl. Pflanzenbau u. Schutz, Vol. VII., No. 12.)

Live Stock—

Le Cheval de Trait. Mesure de sa Puissance et Meilleures Conditions de Traction, *Pierre de Choin*. (Ann. Inst. Nat. Agron., 2 Ser., Vol. VIII., Pt. 2.)

Dairying—

The Problem of a Pure Milk Supply, *F. N. Kay Menzies*. (Local Govt. Rev., Vol. I., No. 3.)

Forestry—

Influence du Couvert de la Forêt sur la Température du Sol, *G. Huffel*. (Rev. Eaux et Forêts, 1 Dec., 1909.)

The Sitka Spruce as a Tree for Hill Planting and General Afforestation, *J. D. Crozier*. (Trans. Roy. Scot. Arbor. Soc., Vol. XXIII., Pt. I.)

Part I. of a Paper on "Home-Grown Coniferous Timber," *C. H. B. Cane*. (Jour. Land Agents' Soc., Vol. IX., No. 1.)

Le choix des semences en culture forestière, *Ph. Guinier*. (Ann. Sci. Agron., 3 Ser., Vol. II., Pt. 6.)

The Productivity of Woodland Soil, *J. Nisbet*. (Sci. Prog., Jan., 1910.)

Butterflies and Larger Moths affecting Forestry in Britain, *B. W. Adkin*. Report of Committee of Roy. Eng. Arboricultural Soc. on the Rating and

Taxation of Woodlands. (Quart. Jour. Forestry, Vol. IV., No. I.)

Forestry Notes, *W. Dallimore*. (Kew Bulletin, No. 1, 1910.)

Economics—

The Development and Road Improvement Act, 1909, *H. Trustram Eve*. (Jour. Farmers' Club, Jan., 1910.)

ADDITIONS TO THE LIBRARY.

[NOTE.—The receipt of annual publications of foreign agricultural and other departments, experiment stations, and societies is not noted in the monthly list of additions to the Library. A list of these publications appeared in the *Journal* for October, November, and December, 1909.]

Agriculture, General and Miscellaneous—

Jago, W.—A Manual of Forensic Chemistry, dealing especially with Chemical Evidence. (256 pp.) London: Stevens and Haynes, 1909. 5s. net.

Kerr, W. A.—Peat and its Products. (318 pp.) Glasgow: Begg, Kennedy and Elder, 1905.

Memoirs of the Geological Survey, England and Wales.—The Geology of the Country around Bodmin and St. Austell. (201 pp.) 4s. The Geology of the Melton Mowbray District and South-East Nottinghamshire. (118 pp.) 2s. 6d. London: E. Stanford, 1909.

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